

YEAR 1906

Eleven storms were found to have occurred in 1906. Tracks for these storms are presented in Fig. 2.

Storm 1, 1906 (Jun. 8-14), T. S.

The following information was found about this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Jun. 8, no data in the vicinity of the storm. Jun. 9, ship near 24.3 N., 83 W., S.E. f. 6, 29.74; ship near 23.7 N., 81 W., S.E. f. 8. Jun. 10, ship near 24.5 N., 83.2 W., S. f. 5, 29.64; ship near 23.5 N., 84 W., W. f. 7. Jun. 11, ship near 26.7 N., 85.7 W., N.N.E. f. 9, 29.56; ship near 24.5 N., 83 W., S. f. 6, 29.66. Jun. 12, ship near 26 N., 84 WE, S.W. f. 9, 29.56; ship near 25.7 N., 85.7 W., W. f. 6, 29.65; Tampa, S.E. f. 4, 29.65; Pensacola, N.E. f. 4, 29.64. Jun. 13, center below 1005 millibars (29.68) placed over N.E. Alabama; data difficult to read off the map. Jun. 14, weak low pressure (extratropical) over central Illinois; system difficult to follow after this day (Historical Weather Maps, Jun. 1906). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 2) Central Meteorological Station, Jun. 9. The center of the perturbation which we talked about yesterday is still to the third quadrant and continues producing rains over the western portion of the Republic. At midnight (Jun. 8-9) the wind at Havana reached a maximum of 21.5 meters per second (48 mph). Ships sailing to the N., today and tomorrow, should exercise caution (Diario de la Marina, Havana, Jun. 10, 1906, morning edition, p.10, col.1). 3) Havana, Jun. 10. The Meteorological Station of the Republic has informed that at 10 A.M. yesterday (Jun. 9) the barometer read 752.76 millimeters (29.64 inches) and at 4 P.M. 751.48 millimeters (29.59 inches). The predominant wind was S.E. 5 meters per second or 11.2 mph (Diario de la Marina, Havana, Jun. 11, 1906, evening edition, p.2, col.1). 4) Belen College Observatory, Jun. 9, 11:30 A.M. At 7 A.M. we sent to the Weather Bureau of Washington the following cablegram: "Center of perturbation about 250 miles W. of Habana". In response to the telegram we received the following: "Storm advisory, 10 A.M. Perturbation at this time W. of Cuba will probably move N.E. causing strong winds on the Florida coast this afternoon or tonight, particularly at Key West, Miami, Jupiter and Jacksonville". There is no danger for us. L. Gangoiti, S.J. (Diario de la Marina, Havana, Jun. 9, 1906, evening edition, p.2, col.4). Author's note: The storm position given by Father Gangoiti was too far W. 5) Washington, Jun. 9. A tropical disturbance appeared Saturday morning W. of Cuba and is apparently central tonight off the S.W. Florida coast. It has thus far been attended by rain in Florida and the E. Gulf, with some high winds over the southern portion (The New York Times, Jun. 10, 1906, p.9, col.5). 6) The southern storm is still central off the western coast of Florida and some high winds have been reported from S. Florida stations (The New York Times, Jun. 11, 1906, p.7, col.6). Author's note: The above statement was probably issued in the evening of Jun. 10. 7) The southern storm appears to be still central in the eastern Gulf, with a slight diminution in intensity. Abnormally high tides were reported at Tampa and reports from southern Florida stations are missing (The New York Times, Jun. 12, 1906, p.9, col.7). Author's note: The above statement was probably issued in the evening of Jun. 11. 8) A ship from Galveston was wrecked at (Cayo) Buena Vista, Pinar del Rio, on Saturday (Jun. 9). Guardia Rural forces are helping the crew (Diario de la Marina, Havana, Jun. 11, 1906, evening edition, p.2, col.2). 9) The steamer "Conde de Wifredo", which arrived from New Orleans today, experienced much high wind and rough sea during the voyage (Diario de la Marina,

Havana, Jun. 12, 1906, evening edition, p.2, col.2). 10) Tampa, Jun. 14. The schooner "Emma J. Cottingham" developed a leak during the Saturday's storm (Jun. 9) and sank near Egmont Key on Sunday. The crew was picked up by the schooner "Thomas Denninson" (Diario de la Marina, Havana, Jun. 14, 1906, evening edition, p.2, col.4). 11) Of the June storms, one passed inland near Apalachicola on Jun. 12, attended by heavy rains but no winds of extraordinary force (Tannehill, 1938). 12) Storm of Jun. 12, 1906. Apalachicola. Minor (Dunn and Miller, 1960). 13) Some maximum velocities apparently associated with the storm were: Charleston, E. 47 mph; Savannah, S.E. 36 mph; Atlanta, N.E. 42 mph; Tampa, S.W. 39 mph; all of the velocities above were recorded on Jun. 12 (Monthly Weather Review, Jun. 1906). 14) Map showing a track for the storm: The track was started near 23 N., 85 W. in the morning of Jun. 9 and showed the storm moving N. until reaching N.E. Alabama in the morning of Jun. 13. It turned then to the N.N.W. and it was located over central Illinois in the morning of Jun. 14. By the morning of Jun. 15, the center was shown near 44 N., 88 W. and by the morning of Jun. 16 was shown near 43.5 N, 80 W., moving then to the S.E. (Monthly Weather Review, Jun. 1906). 15) A storm was first observed near 18 N., 82 W. on Jun. 8, 1906 and lasted 8 days; it recurved near 38 N., 90 W. and it was last observed near 44 N., 80 W. (Mitchell, 1924). Author's note: A track shown in Tannehill (1939) was found to be very similar to the corresponding track shown in Mitchell (1924). The track in Neumann et al. (1993) was also similar to the one in the publication just mentioned; however, the track in Mitchell (1924) was extended until Jun. 16 whereas the one in Neumann et al. (1993) was ended on Jun. 13.

On the basis of information in the above items, particularly in item 1), the author introduced some modifications along the track for Storm 1, 1906 which is displayed in Neumann et al. (1993). The 7 A.M. Jun. 8 position in the above publication was kept unchanged because such a position could not be checked due to lacking information for that day in item 1). Author's 7 A.M. positions for the period Jun. 9-12 were estimated as follows: Jun. 9, near 23.0 degrees N., 84.0 degrees W.; Jun. 10, near 25.0 degrees N., 84.3 degrees W.; Jun. 11, near 26.5 degrees N., 85.0 degrees W.; Jun. 12, near 28.5 degrees N., 85.5 degrees W. These new positions were about 30 miles to the E. of the ones in Neumann et al. (1993) for Jun. 9-10, about 60 miles to the S.S.E. of the 7 A.M. Jun. 11 position in the above publication and about 40 miles to the S. of the 7 A.M. Jun. 12 position in Neumann et al. (1993). Their 7 A.M. Jun. 13 position was kept unchanged but their track was extended to Jun. 14 by introducing a 7 A.M. position near 40.0 degrees N., 89.5 degrees W. for that day, in accordance with information in items 1) and 14). The author's track is displayed in Fig. 2.

The tropical storm status which Neumann et al. (1993) gave to Storm 1, 1906 was supported by information contained in items 1), 2) and 13). Tropical storm intensity was denoted along the author's track for the period Jun. 8-13 and the extratropical stage was introduced during the latter day in order to comply with information for Jun. 14 in item 1).

Storm 2, 1906 (Jun. 14-23), H.

The following information was found about this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Jun. 14, ship near 22 N., 78 W., W. f. 5, 29.91; ship near 22 N., 74 W., S.E. f. 4, 29.94; ship near 24 N., 79 W., E. f. 2, 29.91. Jun. 15, no data in vicinity of center, low placed just E. of Isle of Pines (wrong position). Jun. 16, Key West, E. f. 5, 29.77; ship or lighthouse near 24.5 N., 83 W., E. f. 6, 29.76, rain; center of low placed between Havana and Isle of Pines (wrong position). Jun. 17, Jupiter, E. f. 7, 29.70, rain; Key West, W.

f. 6, 29.75; ship near 24 N., 79 W., W.S.W. f. 6, 29.77, rain. Jun. 18, ship near 29 N., 76 W., N.W. f. 6; ship near 27 N., 74 W., S.S.W. f. 6, 29.88; ship near 33 N., 73 W., S.S.E. f. 7, 29.83; ship near 32 N., 77 W., E. f. 5, 29.77 ((wind direction seems wrong, pressure too high); low below 1005 millibars (29.68) placed 32 N., 76 W. (probably too far N. and W., near 30.7 N., 74.7 W. looks more seasonable). Jun. 19, ship near 37 N., 68.0 W., S.S.E. f. 9, 29.62; ship near 37 N., 72 W., N.E. f. 6, pressure could not be read, rain; low placed 36.5 N., 69.5 W. Jun. 20; low placed 36 N., 65 W., circulation defined by several ships along the periphery of the low. Jun. 21, ship near 35 N., 61.5 W., S.S.E. f. 6 (not clearly read), 29.74; ship near 34 N., 64.5 W. N.N.W. f. 5, 29.74. Jun. 22, center near 36 N., 60 W., defined by several ships along the periphery of the storm. Jun. 23, low below 1010 millibars (29.83) near 37 N., 55 W., a ship with S. f. 4 wind east of the low and a second ship with N. f. 5 wind to the W.N.W. of the low. Jun. 24, low having been absorbed in a frontal trough (Historical Weather Maps, Jun. 1906). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 2) Observations taken at Santa Clara (central Cuba) by Mr. Jover: In the afternoon of Jun. 14 the first clouds which were coming from the N.W. were observed, accompanied with torrential rain and gusty winds; by sunset the wind was N.W. with rain. By daybreak Jun. 15 the wind had backed to the S.S.W. and the barometer had dropped significantly. Obviously the center had moved towards the Florida Straits, "getting ready for its recurvature to the N.N.E." (Diario de la Marina, Havana, Jun. 21, 1906, morning edition, p.6, col.4-5). 3) Belen College Observatory, Jun. 15. We have sent today the following cablegram to the Weather Bureau of Washington: "Jun. 15, the center of the perturbation is near Cay Sal moving towards the Florida Straits". L. Gangotti, S.J. (Diario de la Marina, Havana, Jun. 16, 1906, morning edition, p.8, col.1). 4) Havana, Jun. 15. According to observations of the Department of Meteorology of the Republic and telegrams received, there is a center of minimum pressure approximately to the E.S.E. of this capital (Diario de la Marina, Havana, Jun. 16, 1906, morning edition, p.8, col.1). Author's note: The position to the E.S.E. of Havana would have implied that the center was over land which, in reality, was not found to be the case. 5) Havana, Jun. 16. Observations taken at the Central Meteorological Station on Jun. 15: Barometer, 10 A.M. 756.61 millimeters (29.79 inches); 4 P.M., 753.20 millimeters (29.65 inches). Variable wind, average speed 5.6 meters per second or 12.5 mph (Diario de la Marina, Havana, Jun. 16, 1906, evening edition, p.2, col.2). 6) Central Meteorological Station, Jun. 16, 8 A.M. "The center of the perturbation continues to the E.S.E. of Havana, with N.E. wind since yesterday afternoon which has not exceeded 16 meters per second (36 mph). Observations from Havana and Pinar del Rio indicate that the motion is towards the fourth quadrant. Luis G. Carbonell (Diario de la Marina, Jun. 16, 1906, evening edition, p.2, col.1). 7) Central Meteorological Station, Jun. 16. The center of the perturbation is moving towards the fourth quadrant and is to the N. of the capital, where the lowest pressure occurred at noon (Jun. 16) when the wind reached 21.5 meters per second (48 mph) in gusts (Diario de la Marina, Havana, Jun. 17, 1906, morning edition, p.2, col.5-6). 8) Belen College Observatory, Jun. 16, 7 P.M. At noon we sent the following cablegram to the Weather Bureau of Washington: "The center of the perturbation is to the N. and not far from Matanzas, moving towards the W.N.W.". We received from Washington: "Storm warnings have been ordered at Tampa, Punta Gorda, Punta Rassa, Key West, Miami and Jupiter at 4 P.M. The storm appears to be moving W., but inclining to the N. Strong easterly winds on the Florida coasts tonight and Sunday". (Diario de la Marina, Havana, Jun. 18, 1906, evening edition, p.2, col.5). 9) Sagua la Grande, Jun. 15, 4:15 P.M. As a result of the rain storm the Sagua River has overflowed (Diario de la Marina, Havana, Jun. 16, 1906, morning edition, p.8, col.1). 10) Santo Domingo (central

Cuba). Jun. 15, 5 P.M. The Sagua River is overflowing due to the rain storm (Diario de la Marina, Jun. 26, 1906, morning edition, p.8, col.1). 11) Matanzas, Jun. 15, 7 P.M. A strong rain and wind storm prevails since this morning. Reports from Union de Reyes, Jovellanos and Colon indicate that the weather has the aspect of a tempest (Diario de la Marina, Havana, Jun. 16, 1906, morning edition, p.8, col.1). 12) Pedro Betancourt, Jun. 16. Since 2 A.M. yesterday rain has not stopped and has been accompanied by gusts from the S. and S.W. At 9:40 A.M. today there is no improvement (Diario de la Marina, Jun. 20, 1906, evening edition, p.6, col.6). Author's note: Pedro Betancourt is located near the center of Matanzas province. 13) There were abundant rains and the wind blew from the S. at Moron (on the northern coast of Camaguey province). The wind force at Matanzas reached 12.5 meters per second or 28 mph (Diario de la Marina, Havana, Jun. 19, 1906, evening edition, p.1, col.2). 14) The sloop "Siglo XX" brought here the crew of the schooner "Hidie Feroe" which was wrecked at Punta India (Rincon de Guanabao) and sunk at 12:30 hours on Saturday, Jun. 16 (Diario de la Marina, Havana, Jun. 20, 1906, morning edition, .8, col.1). 15) A moderate cyclone near the northern coast of the Santa Clara and Matanzas provinces. Some vessels were lost and there was extensive flooding (Sarasola, 1928). Author's note: Actually taken from the catalog of Cuban cyclones by M. Gutierrez- Lanza which is included in Sarasola (1928). 16) A cyclone to the north of the central provinces of Cuba on Jun. 15-16 caused heavy rains at Remedios (Martinez-Fortun, 1942). Author's note: Remedios is located near the northern coast of central Cuba. 17) At Key West, wind was N.E. 38 mph and pressure was 29.60 inches at station level (29.62 inches corrected to sea level) at 8 P.M. Jun. 16. The maximum wind velocity was 42 mph (Weather Bureau, 1908). 18) Other maximum velocities were: N.E. 70 mph at Sand Key on Jun. 16 and N.E. 49 mph at Jupiter on Jun. 17 (Monthly Weather Review, Jun. 1906). Author's note: Tannehill (1938 also published these maximum winds. 19) The minimum pressure at Jupiter was 29.64 inches (Weather Bureau, 1908). Author's note: Probably this value was not corrected to sea level. 20) The rain began to fall and the wind to blow (at Miami) in the early part of Saturday night (Jun. 16) and with an occasional let-up continued all night until 6 A.M. Sunday. At this time the wind calmed down and the sun tried hard to come out but was again covered by the gathering storm and about 8 A.M. the wind and rain again reigned supreme and kept up until 11:45 A.M. (The Daily Miami Metropolis, Jun. 18, 1906, p.1, col.1). 21) Metropolis Bureau, Key West, Jun. 21. The steamer "Olivette" arrived Sunday morning (Jun. 17) from Havana, having been out 18 hours. The sea was very rough but the steamer made good headway. She left Havana at 3 o'clock Saturday afternoon (Jun. 16). As night approached the storm increased and on account of the torrents of rain Sand Light was not discernable. Not daring to venture along the reefs under such conditions, the captain lay to until daylight. The storm when blew over the city (Key West) Saturday was very severe and had it lasted longer serious damage would have resulted. For a time the wind blew at 42 mph and rain fell in torrents. About 8 P.M. the storm began to abate and by daylight the storm has passed (The Daily Miami Metropolis, Jun. 22, 1906, p.6, col.3). 22) During the storm a big boat was dashed through the Peacock (Coconut Grove) stove wharf and both were badly damaged. Just before day (Jun. 17) the big sloop "Springwell" came ashore at Mr. Kirk Monroe's place. Capt. Sweeting said that he had drifted from Cape Florida where he was anchored Saturday night (The Miami Metropolis, Jun. 22, 1906, p.7, col.3). 23) Storm of Jun. 17, 1906. Extreme South Florida. Minimal (Dunn and Miller, 1960). 24) The tropical disturbance is apparently still off the eastern Florida coast and diminishing in energy (The New York Times, Jun. 18, 1906, p.7, col.6). Author's note: The above statement was probably issued in the evening of Jun. 17. 25) Map showing a track for this storm. The track was started near

Cienfuegos in the morning of Jun. 16. The center was placed near 23.5 N., 81 W. by the evening of that day and near 26 N., 80.5 W. in the morning of Jun. 17. It was near 29 N., 79.5 W. by the evening of Jun. 17 and near 33 N., 76 W. in the morning of Jun. 18 (Monthly Weather Review, Jun. 1906). Author's note: With the exception of the Jun. 17 morning position given above, all other positions proved to be in significant error. 26) A storm was first observed near 22 N., 76 W. on Jun. 12, 1906 and lasted 14 days; it recurved near 23 N., 82 W. and it was last observed near 46 N., 24 W. (Mitchell, 1924). Author's note: The corresponding track in the above publication suggested that Jun. 12 was not the starting date for this storm and that the correct day should be Jun. 14; this track brought the storm center over central Cuba on Jun. 15-16, which proved to be wrong. The track in Tannehill (1938) was found to be very similar to the one in Mitchell (1924). The track for this storm in Neumann et al. (1993), although showing some similarities with the above tracks, did not bring the storm center over Cuba but it made to pass a short distance off the northern Cuban coast.

On the basis of information in the above items, the author of this study introduced a number of modifications along the track in Neumann et al. (1993). The author's track was started with a 7 A.M. Jun. 14 position which was estimated near 23.0 degrees N., 77.5 degrees W. on the basis of information for that day in items 1) and 2); this position was found to be about 90 miles to the W.N.W. of the corresponding one in Neumann et al. (1993). The author's 7 A.M. Jun. 15 position was near 23.3 degrees N., 80.5 degrees W. and was based on information in items 2) and 3); this position was found to be about 150 miles to the W.N.W. of the one in the above publication. The author's 7 A.M. Jun. 16 position was estimated near 23.5 degrees N., 81.5 degrees W., primarily on the basis of information in item 8) and to a lesser extent on information in item 12); this position was about 80 miles to the W.N.W. of the corresponding one in Neumann et al. (1993). The author's 7 A.M. Jun. 17 position was based on information in item 20) which showed the storm center to have been over Miami at that time; this position was near 25.7 degrees N., 80.3 degrees W. and was found to be about 70 miles to the S. of the corresponding position in the above publication. On the basis of information in item 1), the author estimated 7 A.M. positions for the period Jun. 18-23 as follows: Jun. 18, near 31.0 degrees N., 74.7 degrees W.; Jun. 19, near 36.3 degrees N., 69.5 degrees W.; Jun. 20, near 36.0 degrees N., 65.0 degrees W.; Jun. 21, near 35.0 degrees N., 63.0 degrees W.; Jun. 22, near 36.0 degrees N., 60.0 degrees W.; Jun. 23, near 37.0 degrees N., 55.0 degrees W. Differences between author's positions for the period Jun. 18-23 and the corresponding ones in Neumann et al. (1993) were found to range from about 120 miles on Jun. 20 to just a few miles on Jun. 21-22. The author's track for Storm 2, 1906 is shown in Fig. 2.

The author of this study accepted the hurricane status which Neumann et al. (1993) gave to this storm; his acceptance was based on the fact that a wind velocity of 70 mph from the N.E. was recorded at Sand Key (item 18), indicating that the 1-minute averaged wind at that station probably reached hurricane intensity (74 mph) but, even if this were not the case, hurricane winds should have blown at any rate to the east of the N. and N.E. moving storm center, which obviously passed to the E. of Sand Key. Therefore, hurricane intensity was denoted along the author's track starting as the storm crossed the 24 N. parallel in the afternoon of Jun. 16. Prior to that time, tropical storm intensity was denoted along the author's track. As in Neumann et al. (1993), weakening to tropical storm status was introduced along the author's track early on Jun. 21 and the extratropical stage was introduced on Jun. 23.

Storm 3, 1906 (Aug. 22-25), T. S.

This is a new case which has been recently documented by the author of this study; the case, of course, is not included in Neumann et al. (1993).

Documentation of this case was based on the following information: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Aug. 22, low placed 29 N., 53 W. (probably a bit E.); ship near 28 N., 51 W., S. f. 6, 29.97; ship near 30 N., 61 W., N. f. 3, 30.06. Aug. 23, low placed 32 N., 59 W. (too far N. and W., 31.7 N., 56.7 W. appears to be a much better location); ship near 32 N., 55.3 W., S.E. f. 8, pressure could not be clearly read but probably 30.12 inches (too high). Aug. 24, low below 1005 millibars (29.68) placed 33.5 N., 56 W. (too far W., near 33.5 N., 54.5 W. appears to be much better); ship near 33 N., 55 W., W. f. 10, 29.62. Aug. 25, frontal wave near 39 N., 48 W.; ship near 39 N., 46 W., S.S.E. f. 5, 29.65, temperature 76 degrees Fahrenheit; ship near 38.5 N., 51 W., N. f. 7, 29.94 (probably too high), temperature 67 degrees Fahrenheit. Aug. 26, system could not be identified (Historical Weather Maps, Aug. 1906). Author's note: Wind forces (f) are on Beaufort scale, pressures are in inches.

Based on information in item 1), the author of this study prepared a track for Storm 3, 1906. Author's 7 A.M. positions were estimated as follows: Aug. 22, near 29.0 degrees N., 54.0 degrees W.; Aug. 23, near 31.3 degrees N., 56.7 degrees W.; Aug. 24, near 33.5 degrees N., 54.5 degrees W.; Aug. 25, near 39.0 degrees N., 48.0 degrees W. The author's track is displayed in Fig. 2.

As a maximum wind reported in connection with this storm was W. f. 10 on Aug. 24, the author of this study decided to assign tropical storm intensity to this weather system; however, he admits that there is a chance that stronger winds had occurred and, if this were the case, hurricane intensity could have been reached. Tropical storm status was denoted along the author's track over the period Aug. 22-24 and the extratropical stage was introduced on Aug. 25.

Storm 4, 1906 (Aug. 25- Sept. 12), H.

This storm corresponds to Storm 3, 1906 in Neumann et al. (1993).

The following information was found in relation to this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Aug. 25-26, data do not clearly fit the existence of a cyclonic circulation in the eastern Atlantic. Aug. 27, ship near 17 N., 34 W., E. f. 5, 29.91; ship near 14 N., 28 W., S.S.E. f. 1. Aug. 28, ship near 17 N., 49 W., E.N.E. f. 4. Aug. 29, center of low placed 10 N., 47.5 W. (too far S.). Aug. 30, ship near 15 N., 53 W., E. f. 6, 29.83, rain; ship near 12 N., 51 W., S.W. f. 4, 29.94; ship near 12 N., 57 W., N.W. f. 1, 29.97; Barbados, N.E. f. 1, 29.95; center of low placed 13 N., 53.5 W. Aug. 31, center of low placed near 18 N., 56 W. (too far N.); ship near 19 N., 59 W., N.E. f. 4, 29.80 (Historical Weather Maps, Aug. 1906). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 2) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Sept. 1, ship near 17.5 N., 60 W., E. f. 9, 29.62; Dominica, W. f. 3, 29.82; St Kitts, N.E. f. 3, 29.77; ship near 17.7 N., 61.7 W., E.N.E. f. 6, 29.80; Martinique, S.W. force could not be read, 29.85; Barbados, S.W. f. 4, 29.92; center placed 17 N., 60 W. Sept. 2, St Kitts, S. f. 7, 29.79; ship near 19 N., 64 W., E.S.E. f. 3, pressure could not be read, ship was apparently in the vicinity of the storm center as suggested by the weak wind; San Juan, N.W. f. 4, 29.74, center placed near 17 N., 64.7 W. (too

far S.). Sept. 3, ship near 23 N., 65 W., E.N.E. f. 10; ship near 22 N., 68.7 W., N.E. f. 4, pressure could not be read, rain; San Juan, S.W. f. 4, 29.70; center placed 21.3 N., 64.7 W. (too far N. and E.). Sept. 4, San Juan, S. f. 4, 29.78; Santo Domingo, S.S.W. f. 3, 29.75; Turks Is., N. f. 5, pressure could not be clearly read but probably around 29.74; ship near 22 N., 64 W., S.E. f. 7, 29.80; center placed 21.5 N., 67.5 W. (too far E.). Sept. 5, ship near 26 N., 68.7 W., E. speed could not be read, 29.80; Turk Is., S.W. f. 6, 29.88; ship near 23 N., 73.7 W., N. f. 3, 29.80 (probably too high); center placed 24.3 N., 69.5 W. (too far E. and probably a bit N.). Sept. 6, no data in the vicinity; center placed 28 N., 75 W. (too far N.). Sept. 7, ship near 31 N., 78 W., N.N.W. f. 7 (wind direction probably in error), 29.77; Jupiter, N.W. f. 3, 29.78; ship near 25 N., 74 W., S.W. f. 5, 29.77, showers; Charleston, N. f. 4, 29.90; Wilmington, N. f. 3, 29.89; Hatteras, N.N.E. f. 4, 29.92; center placed 29 N., 75 W. (it seems too far E. and perhaps a bit S.). Sept. 8, ship near 29 N., 75 W., W.N.W. f. 7, 29.62; ship near 29 N., 68.8 W., S.S.W. f. 10, 29.44; ship near 34.7 N., 71 W., N.E. f. 6, 29.71; ship near 32.8 N., 72.8 W., N.E. f. 6, 29.71; center placed 30.5 N., 69.5 W. (probably a little far E.). Sept. 9, ship near 35.7 N., 65 W., N.E. f. 8; ship near 31 N., 63 W., S. f. 7, 29.68; ship near 30 N., 63 W., S.W. f. 9, 29.59; center placed 34 N., 64 W. (too far N. and E.). Sept. 10, ship near 39 N., 57 W., S.S.E. to S. f. 8, 29.35; ship near 40 N., 62 W., E.N.E. f. 6, 29.56; ship near 41 N., 64 W., N.N.E. f. 6, 29.68; center placed 38.7 N., 60 W. (probably a bit N.). Sept. 11, extratropical low placed 45 N., 45 W. Sept. 12, extratropical low placed 53 N., 25 W. (Historical Weather Maps, Sept. 1906). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 3) Taken from a storm report by E.B. Garriott: According to Mr D. Hope Ross, official in charge of the Weather Bureau office at St. Kitts, the barometer there read 29.76 inches at 6 A.M. Sept. 1, it rose slowly to 29.77 at time of observation, and then fell steadily to 29.64 inches at 5 P.M. Sept. 1, the lowest point reached, and rose slowly afterwards. The wind steadily decreased from midnight Aug. 31 and at 12:30 P.M. Sept. 1 it was less than 3 mph. Shortly after, it increased slowly, shifted from N.N.E. and N. to S.W. and S.S.W.. It blew steadily from that quarter with increased force and reached a maximum velocity of 60 mph between 3:35 and 3:40 A.M. Sept. 2, with an extreme velocity for 1 minute at 70 mph at 3:36 A.M. Rainfalls were heavy and varied from about 6 to 13 inches at different points of the island. The weather observer at San Juan reported that the maximum velocity there was 35 mph from the W. on Sept. 3 and that no material damage was caused on the island although 8.48 inches of rain fell on Sept. 4. During Sept. 4-5 the center of disturbance moved N.W. and passed N. of Turks Island on Sept. 4. During Sept. 6-7 it gradually recurved E. of the northern Bahamas and was severely felt by vessels navigating that region. At 3 A.M. Sept. 7, the schooner "John Rose", in lat. 28 37 N., long. 77 04 W., had a barometer reading of 29.01 inches. The vessel was held before the wind on a S.W. course, and the wind shift encountered was from N.E., back to N. and N.W., but there was no cross seas until the center passed. By the morning of Sept. 8 the storm has completed its recurvature to the N.E. By the morning of Sept. 9, the center had past to the W. and N. of Bermuda and the reading of the barometer at Hamilton was 29.18 inches. The storm was exceptionally severe in the trans-Atlantic steamer tracks on Sep. 10-11. The experience of the steamship "Koenigin Luise" indicates the intensity of the storm in the region of the Grand Banks. The steamer encountered the hurricane Sept. 10 in lat. 39 N., long. 55 W., and at 8 P.M. the barometer read 28.06 inches. The vessel was unable to resume full speed until 5 A.M. Sept. 11, 14 hours after the storm began (Monthly Weather Review, Sept. 1906). Author's note: Tannehill (1938) also offered a brief description of this storm, adding that the storm originated near the Cape Verde Islands. 4) Taken

from the Royal Gazette, Sept. 11: "A severe and prolonged gale visited Bermuda on Saturday and Sunday (Sept. 8-9) but fortunately no great destruction of property has been recorded. For 2 or 3 days previously the barometer gave indications of a change and on Friday afternoon at half past 5 o'clock the reading was 30.03 inches and from that time the glass continued to fall until Sunday morning (Sept. 9) at 9 o'clock it reached its minimum when it recorded 28.90 inches. On Saturday afternoon a breeze sprang up from the southwest and steadily increased in violence until at the height of the gale early Sunday the wind attained a rate of 70 miles an hour..." (Tucker, 1982).

5) Washington, Sept. 1. A tropical disturbance central this morning S.E. of St. Kitts is moving N.W. and is now apparently E.S.E. of Puerto Rico. Thus far on its course it has not, so far as known, developed dangerously high winds (The New York Times, Sept. 2, 1906, p.9, col.6).

6) Belen College Observatory, Sept. 1, 11 A.M. The disturbance E. of Barbados that we indicated yesterday it has moved away somewhat from that island, being now towards the N.N.W. of Bridgetown; it is now moving to the N.W., probably towards Puerto Rico or vicinity. L. Gangoiti, S.J. (Diario de la Marina, Havana, Sept. 1, 1906, evening edition, p.8, col.1).

7) Sept. 1, noon. The Meteorological Service of the Republic has received the following cablegram from the Weather Bureau of Washington: "Perturbation to the E. of the Windward Islands. Center at 8 A.M. to the S.E. of St. Kitts, where the barometer read 29.76 and the wind was N.E. 12 mph, with a maximum velocity of 24 mph. Before we received the above cablegram, we had requested information from Barbados and the reply was: "At 11 A.M., barometer 29.92 inches, wind S. 30 mph, cloudy sky and drizzle. Heavy rough sea and some swell from N.W." (Diario de la Marina, Havana, Sept. 2, 1906, morning edition, p.5, col.1).

8) Washington, Sept. 2. The tropical disturbance was apparently E. of Puerto Rico this morning, moving a little W. of N. (it should probably read N. of W.). High swells were reported from St. Kitts but no destructive winds have occurred elsewhere, so far as is known (The New York Times, Sept. 3, 1906, p.7, col.6).

9) Washington, Sept. 3. The tropical disturbance has not yet passed Turks Island at 3 P.M. Monday (Sept. 3). Its future course is yet uncertain (The New York Times, Sept. 4, 1906, p.9, col.7).

10) The following cablegram was received at the National Meteorological Service from the Weather Bureau of Washington: Advisory issued at 10:45 A.M. (Sept. 3). The tropical perturbation passed to the E. and near Puerto Rico and continues its N.W. course and it will pass near the eastern Bahamas with increased intensity (Diario de la Marina, Havana, Sept. 4, 1906, morning edition, p.6, col.1). Author's note: The same advisory was published by L. Gangoiti of the Belen College Observatory, who added "that it will be felt with some force tonight on the coast of Santo Domingo".

11) Washington, Sept. 4. The tropical disturbance passed Turks Island today on the course N.W. towards the Bahamas. It should manifest itself over the eastern islands of the group in 24 to 36 hours (The New York Times, Sept. 5, 1906, p.9, col.6).

12) This morning (Sept. 4), we have received (at the National Meteorological Service) the following telegrams (from Washington): "Advisory at 10:30 A.M. The center of the perturbation appears to be approaching the E. Bahamas on a course towards the W. one quarter to the N.W. Shipping is considered dangerous for vessels off the southern coast of the United States in the next few days". A second cablegram stated: "Turks Is., 11 A.M., barometer 29.72 inches, wind N.W. 24 mph., cloudy sky" (Diario de la Marina, Havana, Sept. 5, 1906, morning edition, p.8, col.3).

13) Havana, Sept. 5. The following cablegrams were received by the Meteorological Service of Cuba from the Weather Bureau of Washington: "Sept. 4, Turks Is, 1 P.M., barometer 29.70 inches, wind N.W. 28 mph with a maximum of 30 mph, cloudy sky". "Sept. 5 (it should read Sept. 4), 10 P.M. The tropical storm center has passed N. of Turks Is. on a W. one quarter to the N.W. course, posing a danger to shipping off the S.E. coast of U.S. during the next few

days". "Advisory at 4 P.M. Sept. 5. Key West, Miami, Jupiter and Jacksonville are being notified that the tropical perturbation is approaching Nassau and it is likely that will reach the Florida coast Thursday or Thursday night, Sept. 6" (Diario de la Marina, Sept. 6, 1906, morning edition, p.4, col.6). 14) Washington, Sept. 5. The tropical disturbance was apparently central this morning over the eastern Bahamas (The New York Times, Sept. 6, 1906, p.9, col.6). 15) Sept. 6, 6 P.M. The following cablegrams were received at the Central Meteorological Station from the Weather Bureau of Washington: "Advisory at 10:15 A.M. The center of the perturbation is passing near and to the N. of Nassau on a course some to the N. of W. Danger for shipping off the Atlantic coast of the U.S. during the next few days". "Hurricane warnings continue at 4:30 P.M. (Sept. 6) at Jupiter and Jacksonville. The center of the perturbation is over the extreme northern Bahamas, moving some N. of W" (Diario de la Marina, Sept. 7, 1906, p.4, col.5). 16) Washington, Sept. 6. The center of the disturbance has not yet reached the South Atlantic coast, although there were some signs of it this afternoon. Hurricane warnings are displayed on the East Florida coast (The New York Times, Sept. 7, 1906, p.9, col.6). 17) Washington, Sept. 7. The tropical disturbance is probably at sea E. of the Carolinas (The New York Times, Sept. 8, 1906, p.9, col.7). 18) Two maps showing storm tracks, one of them over the period Sept. 1-9 and the second one over the period Sept. 4-9. The first track was shown to extend from the vicinity of the Lesser Antilles to near Bermuda and the second track was started just N. of Puerto Rico. Both tracks showed the storm to have recurved near 28 N., 76.5 W. on Sept. 7 (Monthly Weather Review, Sept. 1906). 19) A storm was first observed near 14 N., 29 W. on Aug. 25, 1906 and lasted 19 days; it recurved near 27 N., 75 W. and it was last observed near 65 N., 21 W. (Mitchell, 1924). Author's note: The track for this storm in Mitchell (1924) was found to be very similar to the one published in Tannehill (1938) and also was quite similar to that in Neumann et al. (1993). On the basis of information in the above items, the author of this study introduced a series of modifications along the track for this storm which Neumann et al. (1993) show as for Storm 3, 1906. No modifications were introduced over the period Aug. 25-27 because the track for those days could not be checked against data (item 1). On the basis of data in item 1) and space-time continuity, the author's 7 A.M. positions for Aug. 28-31 were estimated as follows: Aug. 28, near 14.0 degrees N., 43.0 degrees W.; Aug. 29, near 13.7 degrees N., 47.7 degrees W.; Aug. 30, near 13.3 degrees N., 53.5 degrees W.; Aug. 31, near 15.0 degrees N., 57.5 degrees W. Author's 7 A.M. positions for Sept. 1-3 were estimated on the basis of information in items 2) and 3); these positions were as follows: Sept. 1, near 17.0 degrees N., 60.7 degrees W.; Sept. 2, near 19.0 degrees N., 64.0 degrees W.; Sept. 3, near 20.0 degrees N., 66.7 degrees W.. The author's 7 A.M. Sept. 4 position was estimated near 21.3 degrees N., 69.7 degrees W. on the basis of information in items 2), 3), 12) and 13). 7 A.M. positions for Sept. 5-6 in Neumann et al. (1993) were found to be reasonable and, therefore, were kept unchanged; however, their positions for 7 A.M. Sept. 7-8 were modified on the basis of information in items 2) and 3), resulting in author's estimated positions near 29.0 degrees N., 76.0 degrees W. and near 30.3 degrees N., 70.5 degrees W. for 7 A.M. Sept. 7 and 7 A.M. Sept. 8. The author's 7 A.M. Sept. 9 position was based on information in items 2) and 4) and was near 32.5 degrees N., 65.7 degrees W. Author's 7 A.M. positions for the period Sept. 10-12 were based on information for those days in item 2), the weather description provided by the "Koenigin Luise" (item 3) and space-time continuity; these positions were as follows: Sept. 10, near 37.0 degrees N., 60.0 degrees W.; Sept. 11, near 45.0 degrees N., 45.0 degrees W.; Sept. 12, near 23.0 degrees N., 25.0 degrees W. The difference between the author's new positions and the ones for corresponding days in Neumann et al. (1993) was found to range from about 200 miles on Aug.

30, Sept. 11 and Sept. 12 to a few miles on Sept. 4 and Sept. 8. The author's track for Storm 4, 1906 is shown in Fig. 2.

The hurricane status that Neumann et al. (1993) gave to this storm as for Storm 3, 1906 was found to be supported by the content of several of the items above. In fact, the barometer reading of 28.06 inches reported by the "Koenigin Luise" at 8 P.M. Sept. 10 (item 3) clearly indicated that Storm 4, 1906 became a major hurricane in the northern Atlantic. As in the storm track shown in Neumann et al. (1993), hurricane status was denoted along the author's track over the period Aug. 25- Sept. 10; however, the author believes that, in reality, hurricane intensity probably was not reached until the end of Aug. The extratropical stage was introduced along the author's track on Sept. 11.

Storm 5, 1906 (Sept. 3-18), H.

This is the same storm which Neumann et al. (1993) identify as Storm 4, 1906.

The following information was found about this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Sept. 3, ship near 12 N., 35 W., N.E. f. 5, 29.80; center placed 10 N., 35 W., probably too far W. Sept. 4, ship near 10 N., 37 W., N. f. 6, 29.71; center placed 9 N., 35.5 W. Sept. 5, ship near 8 N., 39 W., S.W. f. 4, 29.77; ship near 8 N., 42 W., S.W. f. 4, 29.94; center placed 11 N., 39.5 W. Sept. 6, ship near 7 N., 40.7 W., S.W. f. 4, 29.80; center placed 11.5 N., 42.5 W. Sept. 7, ship near 17.7 N., 45 W., E.S.E. f. 6, 29.88; center placed 14 N., 46.5 W. (probably a bit S.). Sept. 8, ship near 15.7 N., 56 W., N. f. 3, 29.91; ship near 16.7 N., 46 W., S.S.E. f. 3; center placed 15 N., 48.5 W. (probably a bit S.). Sept. 9, ship near 14 N., 48 W., W. f. 1; 29.97 (probably too high); ship near 16.8 N., 57 W., N. f. 3, 29.94; center placed 17 N., 51.3 W. (probably a bit S. and too far W.). Sept. 10, ship near 18 N., 57 W., N. f. 3; center not drawn that day; however, it could have been near 19.5 N., 50.5 W. based on space-time continuity; three ships near lat. 10 N. and between 50 W. and 55 W. had W. winds force 2-3. Sept. 11, ship near 22 N., 53 W., E. f. 6, 29.83; ship near 18 N., 56 W., W. f. 3, 29.94; center placed 19.7 N., 51 W., but near 21 N., 54 W. seems to be a much better location. Sept. 12, ship near 27 N., 67 W., N.E. f. 8 (probably too high); ship near 29 N., 60 W., E. f. 4, 29.97; ship near 20 N., 57 W., S. f. 5, 29.97; center placed 24 N., 62 W. (probably a bit N., and too far W.). Sept. 13, ship near 31 N., 62 W., E.S.E. f. 9; ship near 28 N., 63 W., S.E. to S.S.E. f. 8; ship near 23 N., 64.8 W., N. force could not be read, pressure could not be read, showers; ship near 29 N., 69 W., E.S.E. f. 5 (wind direction was probably wrong); ship near 26.7 N., 73.7 W., N.N.E. f. 4, 29.97; center placed 24 N., 63.5 W. Sept. 14, ship near 30 N., 66 W., E. f. 8; ship near 28 N., 65 W., S.S.W. speed not clear but high; center placed 26 N., 66.5 W. Sept. 15, ship near 31 N., 65 W., S.S.E. f. 6, 29.77; ship near 26 N., 69 W., S.W. f. 5, 29.86; ship near 29.8 N., 71 W., N. f. 6; center placed 30 N., 67 W. Sept. 16, ship near 32 N., 71 W., N. f. 10; center placed 31.7 N., 70 W. Sept. 17, data difficult to read off the map; ship near 33 N., 74 W., E.S.E. speed could not be read; ship near 32 N., 77.7 W., N. or N.N.W. wind (speed could not be read); center placed 32 N., 76.5 W. Sept. 18, station near the convergence point of the borders of S.C., N.C. and Ga., N.E. f. 4, 29.83 (lowest barometer in the area); weak low placed in that vicinity (Historical Weather Maps, Sept. 1906). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 2) Taken from a report prepared by E.B. Garriott: On Sept. 12 there was evidence of a slight depression near Puerto Rico. From this position it moved to the neighborhood of the Windward Channel, where there were indications of its presence on Sept. 14, after which it appeared to pass northward over

the ocean. During Sept. 16 falling barometer and increasing N. winds over the South Atlantic coast showed the presence of a barometric disturbance off the coast, but the absence of reports from the ocean area rendered impossible to determine its future course. On the morning of Sept. 17 its close to the Carolina coast was shown and by 1 P.M. it had reached the coast line N. of Charleston, where the barometer at that hour read 29.44 inches and the wind had reached a velocity of 46 mph from the W. The observer at Charleston indicated that the barometer began to fall at 11 P.M. Sept. 16. The wind shifted to N.W. at 5 A.M. Sept. 17 and backed to S. at 5 P.M., from which quadrant it continued until midnight (Sept. 17-18). From 11 A.M. to 9 P.M. it blew a moderate and at times fresh gale, the highest velocity, 48 mph, occurring at 3:30 P.M. The damage to shipping along the coast between Charleston and Wilmington was, however, considerable and crops were destroyed near Georgetown where the center moved inland. At Wilmington the maximum velocity had been 52 mph from the N.E. After crossing the coast line the storm lost strength rapidly and during its subsequent course to the lower Ohio Valley and then northward its energy was expended in heavy rains (Monthly Weather Review, Sept. 1906). Author's note: The above description of the early stages of the storm near Puerto Rico and the Windward Channel proved to be in error. Tannehill (1938) also published a shorter description of the storm in which he added that "no reports were received from the immediate storm center as it moved over land". 3) Washington, Sept. 17. The disturbance reported this morning off Wilmington N.C. has moved W.S.W. and is central tonight over eastern Georgia. The storm is one of a very small diameter but nevertheless of destructive character in the center of the whirl. Winds of 52 mph occurred this afternoon on the Carolina coasts. It now seems that the storm will move inland towards the Mississippi Valley and not N.E. along the Atlantic coast. Storm warnings are displayed from Cape Cod to Jacksonville (The New York Times, Sept. 18, 1906, p.9, col.7). 4) Washington, Sept. 18. The storm that appeared on the South Atlantic coast Monday morning (Sept. 17) has moved N.W. to the western portions of Kentucky and Tennessee with a rapid decrease in intensity (The New York Times, Sept. 19, 1906, p.9, col.2). 5) The steamship "Verona", in yesterday from Port Antonio (Jamaica), was caught in the hurricane which raged off Cape Hatteras on Sunday and Monday (Sept. 16-17). The hurricane came out of the N.E. and, according to the skipper, while it lasted was about as stiff an affair he has encountered in many years. The "Uller" and the "Jamaica" reported encountering the same hurricane. So did the liner "Katahdin" which got in from Jacksonville and Charleston (The New York Times, Sept. 19, 1906, p.16, col.4). 6) Norfolk, Va., Sept. 19. The chart house of the tramp steamer "Laura" was swept into the sea during the hurricane off Hatteras on Sunday night and Monday morning, carrying with it Capt. Charles T. Adams, John Brenaan, the man at the wheel and W. Elliott, a fireman (The New York Times, Sept. 20, 1906, p.1, col.2). 7) Norfolk, Va., Sept. 22. Two seamen were rescued from the wreck of the schooner "Nelson E. Newbury" and landed here by the steamer "Egda". The "Newbury" sailed from Port Royal, S.C. to New York on Sept. 8 and last Monday (Sept. 17) when they were off Charleston a hurricane struck them (The New York Times, Sept. 23, 1906, p.9, col.5). 8) The following maximum wind velocities were associated with this storm: Columbia, S.C., N.E. 44 mph; Charleston, S.W. 48 mph; Wilmington, N.E. 50 mph; Raleigh, N.E. 24 mph; Charlotte, N.E. 32 mph; all of the above velocities were recorded on Sept. 17; Hatteras, N.E. 39 mph on Sept. 16; Asheville, E. 18 mph on Sept. 18 (Monthly Weather Review, Sept. 1906). 9) Minimum pressure at Wilmington was 29.54 inches and at Charleston 29.39 inches, apparently without applying the reduction to sea level (Weather Bureau, 1908). 10) Storm of Sept. 17, 1906. Myrtle Beach, S.C. Major. Barometer 27.90 at Cape Fear (Dunn and Miller, 1960). Author's note: As Cape Fear is only 25

miles from Wilmington and the maximum velocity at the latter place was only 50 mph (item 8) with a minimum pressure of 29.54 inches (item 9), the barometer reading of 27.90 inches is highly suspected to be in error, implying that the storm probably was not a major hurricane. 11) Two maps showing tracks for this storm. Both tracks were started in the vicinity of Hispaniola-Puerto Rico, brought the alleged storm to the Windward Passage on Sept. 13 and then to the N.N.E. until Sept. 15. By Sept. 16 the tracks showed a turn to the N.W. and W.N.W. and on the morning of Sept. 17 the center was placed off the South Carolina coast to the E. of Charleston. One of the tracks showed the center over extreme S.E. Tennessee in the morning of Sept. 18 and then moving northward later that day. The center was placed near Evansville in the morning of Sept. 19, to the W. of Detroit in the morning of Sept. 20 and to the E. of Yarmouth (Nova Scotia) in the morning of Sept. 21 (Monthly Weather Review, Sept. 1906). Author's note: Positions shown along the tracks prior to landfall on the South Carolina coast on Sept. 17 were found to be in error. 12) A storm was first observed near 22 N., 54 W. on Sept. 11, 1906 and lasted 6 days; it was last observed near 34 N., 82 W. (Mitchell, 1924). Author's note: The corresponding track in the above publication was found to be very similar to the track for this storm in Tannehill (1938). However, the track in Mitchell (1924) was started 8 days later than the track in Neumann et al. (1993) which, in turn, was begun about 500 miles to the S.W. of the Cape Verde Islands on Sept. 3.

Primarily on the basis of information in item 1), the author of this study introduced a series of modifications along the track that Neumann et al. (1993) showed as for Storm 4, 1906. No modifications were made over the period Sept. 3-8 because the morning positions along the above mentioned track were found to reasonably agree with information for those days in item 1). 7 A.M. positions in Neumann et al. (1993) for the period Sept. 9-17 were modified on the basis of information in item 1), resulting in the following positions as estimated by the author of this study: Sept. 9, near 18.0 degrees N., 49.3 degrees W.; Sept. 10, near 19.7 degrees N., 50.7 W.; Sept. 11, near 21.0 degrees N., 54.0 degrees W.; Sept. 12, near 22.7 degrees N., 59.0 degrees W.; Sept. 13, near 24.3 degrees N., 63.3 degrees W.; Sept. 14, near 29.0 degrees N., 66.3 degrees W.; Sept. 15, near 30.5 degrees N., 68.0 degrees W.; Sept. 16, near 31.7 degrees N., 70.3 degrees W.; Sept. 17, near 32.3 degrees N., 76.7 degrees W.; differences between the author's positions above and the respective ones in Neumann et al. (1993) were found to range from about 180 miles on Sept. 11 to approximately 40 miles on Sept. 15-16. The author's track allowed for the storm to have made landfall on the South Carolina coast near Georgetown around 1 P.M. Sept. 17 (item 2), and the 7 A.M. Sept. 18 position in Neumann et al. (1993) was adjusted by some 40 miles to the W.N.W. to near 35.0 degrees N., 83.0 degrees W. in accordance with information in item 1). The author's track for Storm 5, 1906 is displayed in Fig. 2.

The hurricane status which Neumann et al. (1993) gave to this storm as for Storm 4, 1906 was found to be supported by information contained in several items, particularly in item 2). Pressure information in item 10) supported major hurricane intensity, but the barometer reading of 27.90 inches at Cape Fear is suspected to be in error. On the basis of significant intensification of the winds around the storm from Sept. 11 to Sept. 13 which can be inferred from information in item 1), the author of this study decided to introduce hurricane intensity along his track on Sept. 12 instead of on Sept. 9 as indicated in Neumann et al. (1993). Prior to Sept. 12, tropical storm intensity was denoted along the author's track. In accordance with information in item 2) indicating rapid weakening after landfall, hurricane intensity along the track was changed back to tropical storm intensity late on Sept. 17. Finally, a depression (dissipation) stage was introduced

on Sept. 18.

Storm 6, 1906 (Sept. 20-29), H.

This is the same storm which Neumann et al. (1993) identify as Storm 5, 1906.

The following information was found about this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Sept. 20, ship near 17 N., 78 W., E. f. 2, 29.88, showers; Kingston, N.E. f. 2, 29.89, rain; ship near 10 N., 77 W., S. f. 3, 29.88; ship near 10 N., 78 W., S.W. f. 2, rain; low placed 15.5 N., 72.5 W (very much too far N. and E.). Sept. 21, Kingston, N.N.W. f. 1, 29.90; ship near 18 N., 75 W., S.S.E. f. 4, 29.91; ship near 16.3 N, 76.3 W., E.S.E. f.3, 29.91; ship near 10 N., 82 W., W. f.2, 29.80; ship near 18 N., 82 W., E. f. 2, 29.91, showers; low placed 13 N., 79 W. (probably a bit S. and E.). Sept. 22, no data, but low placed 16.5 N., 82.5 W. Sept. 23, no data, but low placed 19.5 N., 84.5 W. Sept. 24, ship or station near 24.7 N., 83 W., S.E. f. 8, 29.83; Key West, E. f. 5, 29.84; ship near 23 N., 86 W., N. f. 4, pressure could not be read; center placed 22.7 N., 84 W. (probably too far N. and E.). Sept. 25, ship near 23 N., 85 W., S.S.E. f. 10, 29.62; ship near 26 N., 86 W., E.N.E. f. 8, 29.77 (not clearly read); center placed 23 N., 86 W. Sept. 26, center placed 26.3 N., 87 W.; ship in that vicinity, N. f. 10 (or 12), 28.64; another ship in practically the same position, calm, rain, 28.14 (obviously in the eye of the storm); central pressure of 955 millibars (28.20) written on the map. Sept. 27, center on the coast near the Mississippi-Alabama border; Pensacola, S.S.E. at least f. 8 (maybe higher); New Orleans, N.N.W. f. 6, pressure could not be read. Sept. 28, Memphis, S.E. f. 4, 29.52 (could not be clearly read). Sept. 29, St. Louis, E. f. 3, 29.69; extratropical low placed just S. of the station. Sept. 30, low no longer identified, but its remnants were probably embedded in a cold front over northern Mississippi-Alabama area (Historical Weather Maps, Sept. 1906). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 2) This Sept. 1906 storm was first definitively observed over the western portion of the Caribbean Sea on Sept. 22 and crossed the Gulf coast line W. of Mobile. After leaving the Yucatan Channel on Sept. 24, the storm moved almost due N. over the Gulf of Mexico (Monthly Weather Review, Sept. 1906). Author's note: The above information was taken from a storm report prepared by E.B. Garriott. 3) Washington, Sept. 22. A tropical disturbance was reported Saturday afternoon (Sept. 22) as developing S. of Grand Cayman, probable direction N.W. to the Yucatan Channel (The New York Times, Sept. 23, 1906, p.9, col.7). Author's note: A similar statement was issued by the Belen College Observatory at 4 P.M. Sept. 22 and published in *Diario de la Marina*, Havana, Sept. 23, 1906, morning edition, p.4, col.5). 4) Belen College Observatory, Sept. 23, 4 P.M. At 7 A.M. we sent a cablegram to the Weather Bureau of Washington announcing that the cyclone was intensifying and approaching the Yucatan Channel. From Washington we received the following cablegram at 11:40 A.M. "Storm warnings issued for Key West at 10:30 A.M. The perturbation is approaching the Yucatan Channel and gaining in intensity. Strong E. and S.E. winds are expected along the Florida coast and vicinity. Henry". L. Gangoit, S.J. (*Diario de la Marina*, Havana, Sept. 23, 1906, evening edition, p.1, col.6). Author's note: The whole advisory issued by the Weather Bureau near noon Sept. 23 was also published in The New York Times, Sept. 24, 1906, p.7, col.6). 5) Belen College Observatory, Sept. 24. At 7 A.M. today the center of the cyclone is about 200 miles to the W. one quarter to the S.W. of Havana, probably moving towards the central Gulf. We have just sent this note to the Central Observatory of Mexico and the Weather Bureau of Washington. L. Gangoit, S.J. (*Diario de la Marina*, Havana, Sept. 24, 1906, evening edition, p.1, col.6). 6) National Meteorological

Observatory, Sept. 24, 4 P.M. At noon we received the following cablegram from the Weather Bureau of Washington: "Cyclonic perturbation to the W. of extreme western Cuba, moving northward. Danger for ships sailing from or towards the Gulf ports during the next two days" (Diario de la Marina, Havana, Sept. 25, 1906, morning edition, p.4, col.4). 7) Washington, Sept. 24. The tropical disturbance has passed into the Gulf of Mexico from the Yucatan Channel. Its influence on the Gulf coast has not been felt as yet, except on the southern Florida coast where high S.E. winds are blowing (The New York Times, Sept. 25, 1906, p.9, col.6). 8) Batabano, Sept. 24, 9:40 A.M. Since yesterday we are under the influence of a heavy rain storm. The streets of this town are flooded, reaching a depth of a yard at several places, specially at Pueblo Nuevo (Diario de la Marina, Sept. 24, 1906, evening edition, p.1, col.6). Author's note: Batabano is located on the southern coast of Havana province. 9) Sept. 23-24, 1906. A cyclone of moderate intensity passed through the Yucatan Channel. Heavy rains and floods occurred at Pinar del Rio and Havana provinces (Sarasola, 1928). Author's note: Actually taken from the catalog of Cuban cyclones by M. Gutierrez-Lanza which is included in Sarasola (1928). 10) Belen College Observatory, Sept. 25, 7 A.M. The center of the cyclone was off Cuba yesterday as indicated in our note to Washington published this morning. Now the vortex of the cyclone is about 300 miles to the N.W. one quarter to W. of Havana, moving away from our island and getting ready for recurvature. L. Gangoiiti, S.J. (Diario de la Marina, Sept. 15, 1906, evening edition, p.2, col.2). Author's note: A similar note issued by the National Meteorological Observatory at 8 A.M. Sept. 25 was published in the same edition. 11) Washington, Sept. 25. The tropical disturbance is probably central over the eastern portion of the Gulf of Mexico. It seems from observations at shore stations that the storm should be felt somewhere between the mouth of the Mississippi and the western Florida coast within 36 hours (The New York Times, Sept. 26, 1906, p.9, col.5). 12) Washington, Sept. 26. The tropical disturbance has reached the W. Florida coast in the vicinity of Pensacola where at 8 P.M. Wednesday the wind was blowing at a rate of 48 mph (The New York Times, Sept. 27, 1906, p.9, col.6). 13) Washington, Sept. 27. Delayed reports from Pensacola show that the Gulf storm passed inland at some distance W. of that station with winds of hurricane strength, the maximum velocity there being 88 mph (The New York Times, Sept. 28, 1906, p.9, col.6). 14) Some observations taken at New Orleans: Sept 26, 8 P.M., N. 28 mph, 29.68.; midnight Sept. 26-27, N. 32 mph, 29.59; 4 A.M. Sept. 27, N. 37 mph, 29.49; 8 A.M., N.W. 40 mph, 29.22; 8:15 A.M., 29.15; noon, W. 27 mph, 29.20; 4 P.M. S.W. 23 mph, 29.34; 8 P.M., S.W. 22 mph, 29.47 (Cline, 1926). Author's note: Pressures (sea level) are in inches and times are 90 W. meridian. 1) Some observations taken at Mobile: Sept. 26, 8 P.M., N.E. 26 mph, 29.62; midnight Sept. 26-27, N.E. 31 mph, 29.48; 2 A.M. Sept. 27, N.E. 33 mph, 29.32; 4 A.M. N.E. 34 mph, 29.19; 6 A.M., N.E. 46 mph, 29.00; 7 A.M., E 42 mph, 28.84; 8 A.M. E. 43 mph, 28.90; 9 A.M., S.E. 39 mph, 29.00; 10 A.M., S.E. 28 mph, 29.12; noon, S.E. 21 mph, 29.25; 4 P.M., S.E. 14 mph, 29.35; 8 P.M., S.E. 10 mph, 29.47 (Cline, 1926). Author's note: Pressures (sea level) are in inches and times are 90 W meridian. 16) Some observations taken at Pensacola: Sept. 26, 8 P.M., N.E. 40 mph, 29.52; midnight Sept. 26-27, N.E. 44 mph, 29.35; 2 A.M. Sept. 27, E. 64 mph, 29.29; 4 A.M., E. 74 mph, 29.18; 5 A.M., S.E. 68 mph, 29.17; 6 A.M., S.E. 67 mph, 29.19; 7 A.M., S.E. 72 mph, 29.24; 8 A.M., S.E. 62 mph, 29.31; 9 A.M., S.E. 58 mph, 29.35; 10 A.M., S.E. 55 mph, 29.39; noon, S.E. 53 mph, 29.45; 4 P.M., S. 44 mph, 29.49; 8 P.M., S. 39 mph, 29.59 (Cline, 1926). Author's note: Pressures (sea level) are in inches and times are 90 W. meridian. 17) At Pensacola trees were uprooted, houses unroofed and vessels dragged their anchors. Wind velocities at Pensacola were extremely high;

the maximum was 83 mph from the E. Thirty-two lives were lost at Pensacola and damage in that vicinity amounted to \$ 2 million. Damage to property at Mobile was severe and the tide was 9.9 feet above normal (Tannehill, 1938). 18) Some pressure observations taken on board the U.S. Revenue steamer "Winona" which was at Scranton, Mississippi, during the storm: Sept. 26, 8 P.M., 29.64; midnight Sept. 26-27, 29.45; 4 A.M. Sept. 27, 29.07; 4:30 A.M., 29.02; 5 A.M., 28.96; 5:10 A.M., 28.90; 5:30 A.M. 28.75; 6 A.M., 28.68; 6:30 A.M., 28.55; 7 A.M., 28.50; 7:45, 28.50; noon, 28.70; midnight Sept. 27-28, 29.00. From the beginning of the blow till 7 A.M. Sept. 27 the wind was N.N.E. For 15 minutes after 7 A.M. there was a lull in the wind; then it shifted to the S.W. and blew with terrific force (Monthly Weather Review, Sept. 1906). Author's note: Taken from a report prepared by E.B. Garriott. Pressures are in inches. The noon Sept. 27 and the midnight Sept. 27-28 pressures seem to be in error. 19) At Fort Morgan an anemometer, which owing to its worn condition registers velocities 5 percent too low, was in temporary use during the storm. Several times after midnight (Sept. 26-27) a maximum velocity of 85 mph was recorded for a period of 5 minutes; 3 miles were recorded in 2 minutes, which is at a rate of 90 mph; this, with a 5 percent correction added, is more than 94 mph (Monthly Weather Review, Sept. 1906). Author's note: Also taken from the report by E.B. Garriott. Ft. Morgan is located at the entrance to the Mobile Bay. 20) At Mobile, the rainfall amount from 12:05 P.M. Sept. 26 to 7:20 P.M. Sept. 27 was 6.40 inches (Monthly Weather Review, Sept. 1906). Author's note: Also taken from the report by E.B. Garriott. 21) Louisville, Ky., Sept. 27. Damage to railroads is heavy, the tracks between Flomanton, Al. and Pensacola, Fl. are obstructed. The waters of Lake Pontchartrain, which for the past 24 hours have been 5 feet above normal causing a serious overflow in parts of New Orleans, have receded apparently (The New York Times, Sept. 28, 1906, p.1, col.5). 22) Pensacola, Sept. 27. It is reported that many lives between the city and the Navy Yard have been lost in the hurricane that began last night and is still raging this afternoon. Every home in Pensacola has suffered damage and many roofs are blown off. The water front is strewn with wreckage for miles on either side of the city and vessels are piled on the wharves or ashore (The New York Times, Sept. 28, 1906, p.1, col.5). 23) New Orleans, Sept. 28. The wireless station at the mouth of the (Mississippi) river was abandoned, the last report that there was about 8 feet of water over the floor of the operator's room (The New York Times, Sept. 28, 1906, p.1, col.5). 24) Washington, Sept. 28. The Gulf storm is now central near the lower Ohio Valley, moving N.N.E. (The New York Times, Sept. 29, 1906, p.7, col.6). 25) Washington, Sept. 29. The Gulf storm continues to diminish in intensity and is now crowded southeastward by a strong area of high pressure that is moving E. across the lake region (The New York Times, Sept. 30, 1906, p.9, col.6). Author's note: The above statement was probably issued in the evening of Sept. 29. 26) Some maximum velocities were as follows: Sand Key, S.E. 54 mph on Sept. 24; Key West, S.E. 35 mph on Sept. 24; Jupiter, S.E. 37 mph on Sept. 26; New Orleans, N.W. 49 mph on Sept. 27; Meridian, N.E. 44 mph on Sept. 27; Montgomery, E. 36 mph on Sept. 27; Mobile, E. 55 mph on Sept. 27; Birmingham, S.E. 50 mph on Sept. 27; Pensacola, E. 83 mph on Sept. 27; Atlanta, E. 42 mph on Sept. 27; Chattanooga, S.E. 38 mph on Sept. 28 (Monthly Weather Review, Sept. 1906). 27) Storm of Sept. 27, 1906. Mississippi Delta eastward. Major. Barometer 28.30 inches, estimated (Dunn and Miller, 1960). 28) Two maps showing tracks for this storm. The track shown on the first map was started S. of Hispaniola on Sept. 18 and ended over the eastern Mississippi coast on Sept. 27; however, daily positions were shown with question marks over the period Sept. 18-23. The track displayed on the second map made the storm to have emerged from the Yucatan Channel on Sept. 24 and to have continued on a N.N.W. course, reaching the eastern Mississippi

coast. The last position along the track was near St. Louis in the morning of Sept. 29, from where the storm was shown to have continued to the Chicago area later that day (Monthly Weather Review, Sept. 1906). Author's note: According to information in item 25), the weakening storm apparently moved to the S.E. and not to the N.E. during late Sept. 29. 29) A storm was first observed near 14 N., 32 W. on Sept. 10, 1906 and lasted 20 days; it recurved near 35 N., 91 W. and it was last observed near 52 N., 60 W. (Mitchell, 1924). Author's note: The corresponding track in Mitchell (1924) was very similar to the one shown in Tannehill (1938). Both tracks show the alleged storm to have moved westward, reaching the Lesser Antilles by Sept. 17; however, data in Historical Weather Maps (Sept. 1906) were not sufficient to ascertain that evolution with a reasonable space-time continuity and no closed circulation was drawn on the Sept. 17 map or documented by data as the alleged storm passed into the eastern Caribbean Sea; only a rather weak wave disturbance was apparent on that day. The track in Neumann et al. (1993) was not started until Sept. 19 near 15 N., 72 W., which is a position S. of Hispaniola. This latter track brought the storm center well S. of Jamaica and into the Gulf of Mexico through the Yucatan Channel and not over western Jamaica and western Cuba as in Mitchell (1924) and Tannehill (1938).

By primarily using information in item 1), the author of this study introduced a number of modifications along the track which Neumann et al. (1993) show as for Storm 5, 1906. The author's track was started on Sept. 20, which is one day later than in the above publication, by estimating a 7 A.M. position for that day near 12.5 degrees N., 78.7 degrees W.; this location was found to be about 270 miles to the S.W. of the corresponding one in Neumann et al. (1993); the author's new position was based on two ship reports showing S. and S.W. winds N. of eastern Panama on Sept. 20 (item 1). Author's positions for the period Sept 21-26 were as follows: Sept. 21, near 14.0 degrees N., 80.5 degrees W.; Sept. 22, near 16.3 degrees N., 82.3 degrees W.; Sept. 23, near 18.7 degrees N., 84.0 degrees W.; Sept. 24, near 21.4 degrees N., 85.0 degrees W.; Sept. 25, near 23.3 degrees N., 86.0 degrees W.; Sept. 26, near 26.3 degrees N., 87.0 degrees W.; differences between these positions and the corresponding ones in Neumann et al. (1993) ranged from about 100 miles on Sep. 21 and Sept. 25 to about 30 miles on Sept. 23. Morning positions for Sept. 27-28 in Neumann et al. (1993) were kept unmodified because they were found to agree with information in item 1); however, their 7 A.M. Sept. 29 position was adjusted to the W. by about 50 miles to 38.3 degrees N., 90.3 degrees W. in compliance with information for that day in item 1). The author's track for Storm 6, 1906 is shown in Fig. 2.

The hurricane status which Neumann et al. (1993) gave to this storm as for Storm 5, 1906 was found to be supported by the content of several of the items above. In fact, information in item 1) showing a ship at the vortex of the storm and a central pressure of 28.14 inches in the morning of Sept. 26, together with a minimum pressure reading of 28.50 inches at Scranton, Mi., reported by the "Winona" (item 18) and the estimated pressure of 28.30 inches stated in item 27), showed that, indeed, the storm was a major hurricane. Although the time Storm 6, 1906 reached hurricane intensity could not be ascertained with any degree of confidence, the author decided to introduce that status along his track as the storm crossed the 20 N. parallel late on Sept. 23; his decision was based on the intensification announced in item 4), on the use of the word "cyclone" for first time by the Belen College Observatory on Sept. 24 (item 5), which, in accordance with the usual nomenclature regarding Cuban storms, carried the implication that the cyclonic perturbation had reached hurricane intensity, and on the words "moderate cyclone" which were used as the storm passed through the Yucatan Channel (item 9). Prior to late Sept.

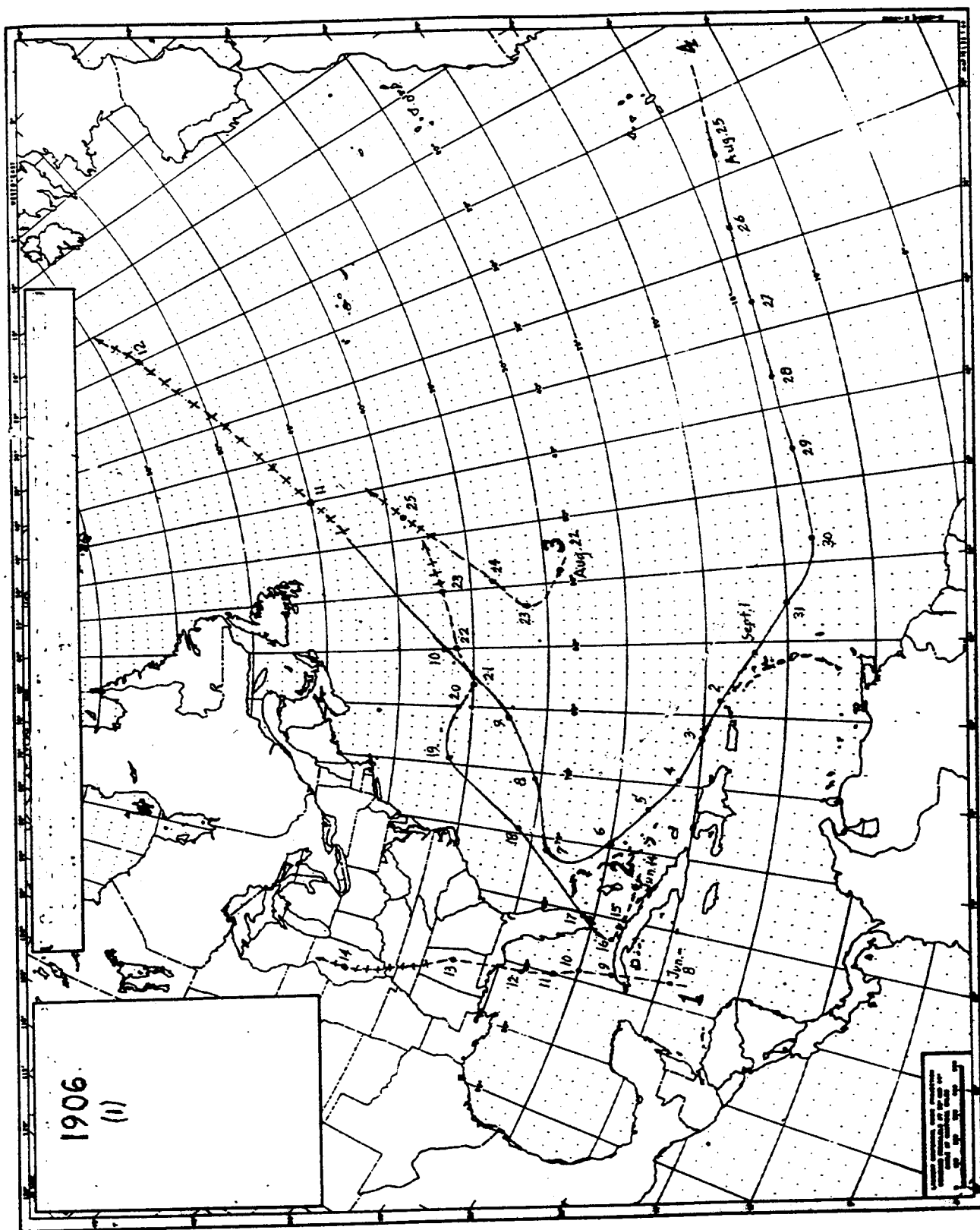


Fig. 2

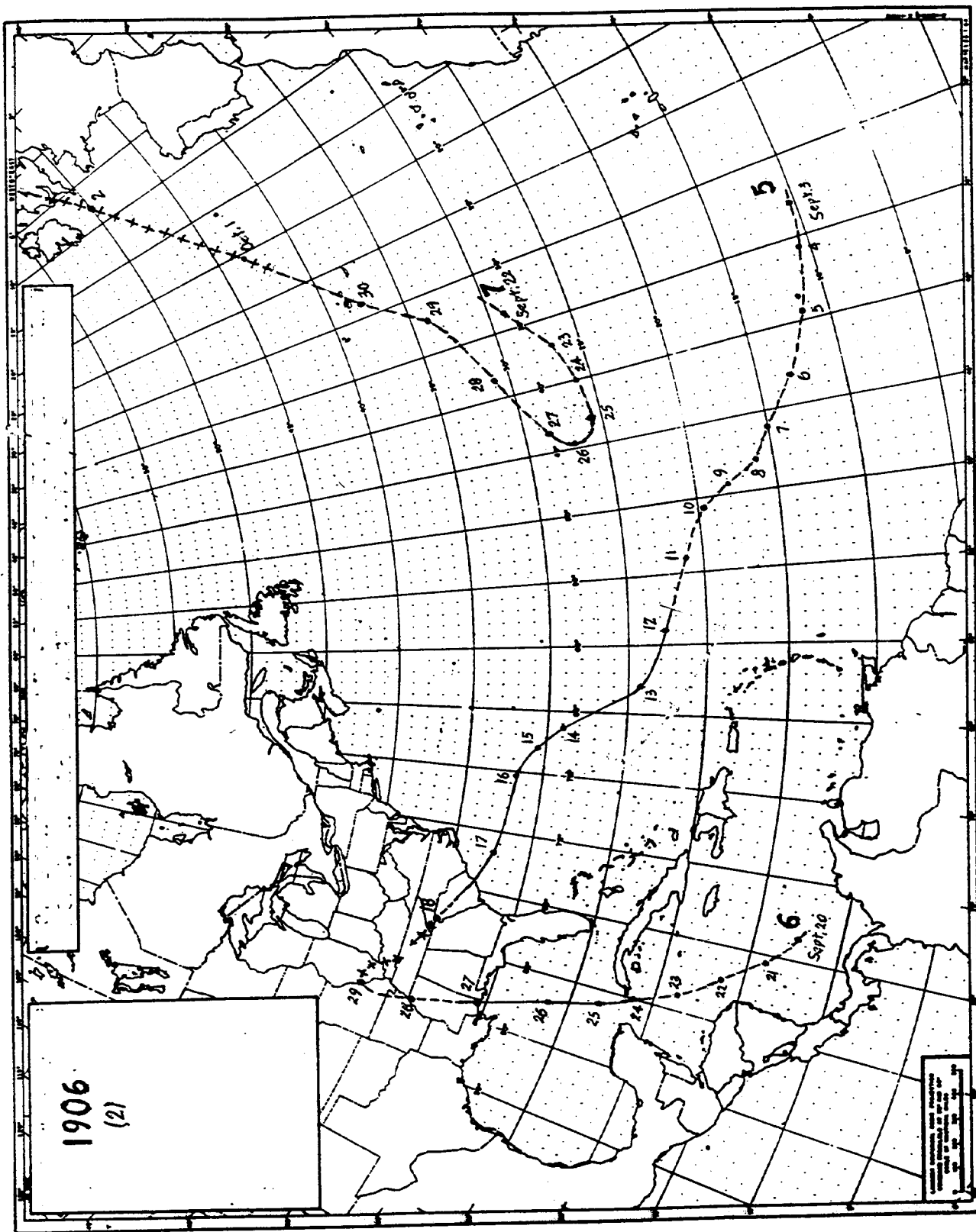


Fig. 2 continued

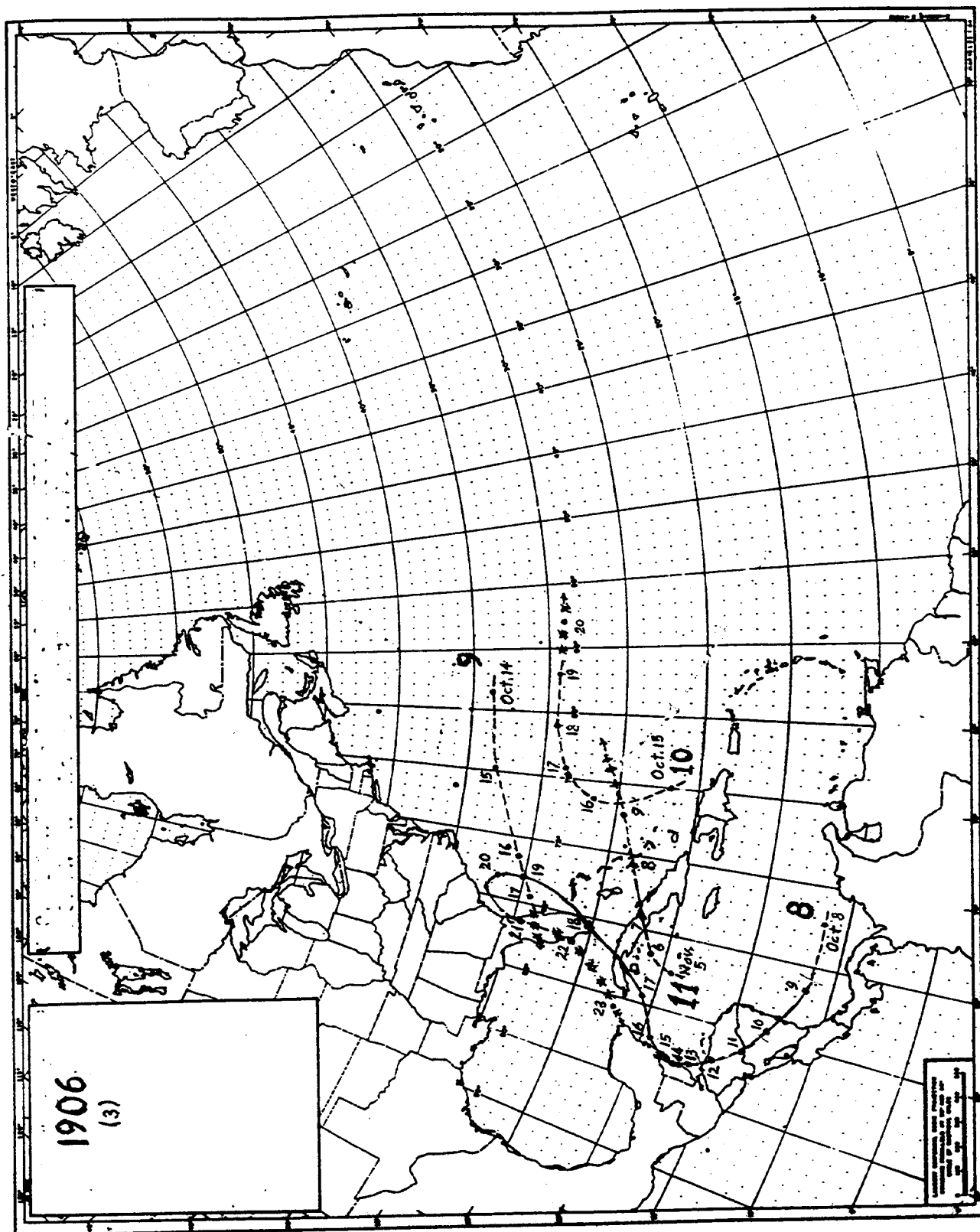


Fig. 2 continued

23, tropical storm intensity was denoted along the author's track, and tropical storm status was reinstated late on Sept. 27 when the storm had moved about 100 miles inland. The extratropical stage was introduced on Sept. 29.

Storm 7, 1906 (Sept. 22- Oct. 2), T. S.

This storm is the same one which Neumann et al. (1993) identify as Storm 6, 1906.

The following information was found about this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Sept. 22, ship near 30 N., 33 W., E.S.E. f. 9, 29.53; ship near 26 N., 32 W., W.S.W. f. 4, 29.97; center placed 29 N., 33 W. (probably too far E.). Sept. 23, ship near 29 N., 36 W., N.E. f. 6, 29.86; ship near 26 N., 37 W., S.W. f. 4, 29.35; center placed 27 N., 36.5 W. (probably a bit E.). Sept. 24, ship near 39 N., 40 W., N.E. f. 5, 30.03; ship near 24 N., 43 W., W. f. 2, 30.00; center placed 26 N., 36 W. (position seems to be wrong, around 26 N., 40 W. would be much better). Sept. 25, ship near 29 N., 43.7 W., S. f. 7 (wind direction probably wrong), 30.12; ship near 23.7 N., 47 W., N. f. 5, 29.94; ship near 22 N., 48.7 W., W. f. 2, 30.03; center placed 27 N., 46 W., (probably too far N. and W.). Sept. 26, ship near 28 N., 46.7 W., N.E. f. 5, 29.97; ship near 25 N., 41.7 W., S. to S.S.W. f. 6, 29.91; center placed 25 N., 44 W. (probably somewhat S.). Sept. 27, ship near 30 N., 43 W., E. f. 7, rain; ship near 30.7 N., 42 W., E. f. 5, 29.94; ship near 27 N., 51 W., N.E. f. 3, 30.06; ship near 26 N., 36 W., S.S.E. f. 5, pressure could not be read; center placed 28.5 N., 43.5 W. Sept. 28, ship near 30 N., 38 W., S.W. f. 7, 29.53; ship near 29 N., 44 W., N.N.W. f. 2, 29.80; ship near 35 N., 41 W., E.N.E. f. 6, showers; ship near 34 N., 41 W., E. f. 3, rain; center placed 30 N., 40.5 W. (31 N., 38.5 W. would be a much better location). Sept. 29, ship near 32.7 N., 30 W., S.S.E. f. 8, 29.65; ship near 35.7 N., 32 W., N. f. 9 (wind direction probably wrong); center placed 33.5 N., 31 W. (maybe a bit E.). Sept. 30, station in the Azores N.W. of Ponta Delgada, S.E. f. 8, 29.54; ship near 42 N., 27 W., S. f. 4, 29.86; ship near 39 N., 22 W., S.W. f. 9, 29.71; ship near 39.5 N., 20 W., S.W. f. 5, 29.97; center placed 40 N., 24 W., with a second center near 50 N., 18 W.; however, a center could be also placed to the S.W. of the station in the Azores, this center was probably the same one of previous days (Historical Weather Maps, Sept. 1906. Author's note: Wind forces (f) are on Beaufort scale and pressures are in inches. 2) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Oct. 1, low placed 43.5 N., 18 W., maybe too far E.; it looks better near 20-21 W.; temperatures in the 60's Fahrenheit north of the low indicate system was becoming extratropical. Oct. 2, temperatures in the 50's and 60's Fahrenheit around the low; center placed 50 N., 8 W. (Historical Weather Maps, Oct. 1906). Author's note: As before, wind forces (f) are on Beaufort scale and pressures are in inches. 3) An advice which was cabled to Lloyd's, London, on Sept. 30 stated that a severe storm south of the Azores would probably move northeastward (Monthly Weather Review, Sept. 1906). 4) The meteorological conditions yesterday were of decidedly threatening character. Early in the morning a cyclonic area of considerable intensity appeared suddenly off our S.W. coasts and by 8 A.M. rain was falling in all the more southern parts of the kingdom. Later in the day the disturbance advanced steadily in a N.E. direction, the wind in the meantime increasing to a gale from the southward in the English and Bristol Channels with continuous rain over a large portion of our central and southern districts. The southerly wind was extremely mild and at 8 A.M. the shade temperature of 62 degrees (Fahrenheit) in London was about 10 degrees above average. The reports at hand last evening showed that the center of the depression had reached central England and that it was apparently moving steadily in a N.E.

direction (The Times, London, Oct. 3, 1906, p.10, cols.4-5).

No tracks for this storm were included in Mitchell (1924) and Tannehill (1938), making of the one in Neumann et al. (1993) as for Storm 6, 1906 the only one available. Primarily on the basis of information in items 1) and 2), the author of this study introduced a number of changes along such a track. The author's track was started with his estimated position near 29.0 degrees N., 33.7 degrees W. for 7 A.M. that day; this position was about 270 miles to the N. of the corresponding one in the above publication. The 7 A.M. Sept. 23 position in that publication was kept unchanged because it was found to agree with information for that day in item 1). New 7 A.M. positions for the period Sept. 24-28 as estimated by the author of this study were as follows: Sept. 24, near 26.0 degrees N., 40.0 degrees W.; Sept. 25, near 25.7 degrees N., 43.0 degrees W.; Sept. 26, near 27.0 degrees N., 44.7 degrees W.; Sept. 27, near 28.5 degrees N., 43.5 degrees W.; Sept. 28, near 31.0 degrees N., 38.5 degrees W.; differences between these positions and the corresponding ones in Neumann et al. (1993) ranged from about 240 miles on Sept. 25 to about 50 miles on Sept. 27. The 7 A.M. Sept. 29 position in the above publication was kept unmodified, but new 7 A.M. Sept. 30- Oct. 2 positions as estimated by the author of this study were as follows: Sept. 30, near 37.7 degrees N., 27.7 degrees W.; Oct. 1, near 43.3 degrees N., 20.5 degrees W.; Oct. 2, near 50.0 degrees N., 8.0 degrees W.; information for Sept. 30 in item 3) and for Oct. 2 in item 4) were also helpful in determining author's positions for those days; differences between author's positions and the corresponding ones in Neumann et al. (1993) ranged from about 200 miles on Sept. 30 to about 70 miles on Oct. 2. The author's track for Storm 7, 1906 is shown in Fig. 2.

The tropical storm status which Neumann et al. (1993) gave to this storm as for Storm 6, 1906 was found to be supported by information contained in item 1). Tropical storm intensity was denoted along the author's track over the period Sept. 22-30 and the extratropical stage was introduced on Oct. 1.

Storm 8, 1906 (Oct. 8-23), H.

This storm was composed from Storms 7 and 8, 1906 in Neumann et al. (1993), which showed to be just one weather system.

The following information was found about this combined storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Oct. 4, Barbados, N.E. f. 3, 29.92; ship near 12 N., 58 W. N.E. f. 4, 29.86; no closed circulation drawn. Oct. 5, Barbados, S.E. f.3, 29.92; Martinique, calm, 29.97 (probably too high); Dominica, S.E. f. 3, 29.92; St. Kitts, S.E. f. 5, 29.94; Trinidad, E. f. 2, 29.92; no closed circulation drawn. Oct. 6, Curacao, N. f. 2, 29.86, rain; no closed circulation drawn, but an incipient one could have been to the E. of Curacao. Oct. 7, Curacao, N.E. f. 3, 29.91; ship near 14 N., 76 W., N.E. f.4, 29.86; no closed circulation drawn, but one isobar showed a good cyclonic curvature over northern Colombia; Oct. 8, ship near 10 N., 78 W., N.W. f. 4, rain; probable center to the N.E. of that ship near 11.3 N., 77.3 W., but not drawn on map. Oct. 9, no data in the storm area. Oct. 10, ship near 13 N., 77 W., S. f. 6; low placed 14.5 N., 81.5 W. (too far to the N.E.). Oct. 11, no data in the storm area; center placed 16.5 N., 83.5 W. (too far to the N.E.). Oct. 12, no data in the storm area. Oct. 13, no data in the storm area; center placed 19 N., 86 W. (too far to the N.E.). Oct. 14, no data in the storm area. Oct. 15, Merida, N.E. f. 4, 29.68; center placed near Chetumal (Mexico). Oct. 16, Merida, N. f. 6, 29.66; center placed 20.5 N., 86.5 W. (probably a bit far to the N.E.). Oct. 17, Merida, calm, 29.76; center placed S.E. of Isle of Pines, which was too far E. (Historical

Weather Maps, Oct. 1906). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 2) Belen College Observatory, Oct. 4, 7:30 P.M. There are indications of a cyclonic perturbation to the S.S.E. and not far from Barbados. Its probable course is W. and N.W. L. Gangoiti, S.J. (Diario de la Marina, Havana, Oct. 5, 1906, morning edition, p. 4, col.3). Author's note: In accordance to item 1), a closed cyclonic perturbation does not appear to have existed on that day. 3) Belen College Observatory, Oct. 5, 7 A.M. The cyclonic perturbation near Barbados last evening, which we announced in this morning's newspapers, is now to the S.W. of Bridgetown, approaching the islands of Grenada and St. Vincent on a W. one quarter to N.W. course. It showed up in the Atlantic yesterday; it will pass to the Caribbean Sea today; it is located at low latitude. L. Gangoiti, S.J. (Diario de la Marina, Havana, Oct. 5, 1906, evening edition, p.1, col.2). Author's note: According to item 1), no closed circulation apparently existed on that day. 4) Belen College Observatory, Oct. 9, 5 P.M. We did not have any news about the cyclonic perturbation to the S.S.E. of Barbados in the evening of Oct. 4 and to the S.W. of the capital of that island on Sept. 5 until the afternoon of Sunday, Oct. 7 it appeared to the S.S.E. at a distance over 400 miles (from Havana). It showed up as a depression of large area and a weak aspiration force; it remained almost stationary on Oct. 8; it has moved somewhat to the W. today, with very weak intensity and organization so far. L. Gangoiti, S.J. (Diario de la Marina, Havana, Oct. 10, 1906, morning edition, p.4, col.5). Author's note: At least for Oct. 9, the above advisory seriously underestimated the storm strength. 5) Barometric pressure at Colon, Panama, the only station in the S.E. Caribbean that sent reports by telegraph to the Weather Bureau at Washington, began to fall on Oct. 6 and continued to fall until the morning of Oct. 9 when a reading of 29.72 inches was reported (Monthly Weather Review, Oct. 1906). 6) Taken from a report made by D. W.F. Thornton, Bluefields (Nicaragua): The following are barometric readings (inches) at Bluefields: Oct. 9, 7 A.M., 29.91; noon, 29.87; 1 P.M., 29.85; 2 P.M., 29.82; 3 P.M., 29.78; 4 P.M., 29.72; 5 P.M., 29.68; 6 P.M., 29.63; 7 P.M., 29.62; 8 P.M., 29.60; 9 P.M., 29.59; 9:30 P.M., 29.57; 10 P.M., 29.60; Oct., 10, 1 A.M., 29.66; 3 A.M., 29.70; 5 A.M., 29.74; 7 A.M., 29.81. Fortunately, Bluefields was but slightly damaged, a few trees uprooted and some corrugated roofing torn off. Beginning 20 miles N. and having a width of 20-25 miles the storm swept everything before it. It traveled from E. to W. and was accompanied by a tidal wave. Some reefs that before the storm were 2-3 feet below the surface are now 4-5 feet above. Small keys have disappeared from the surface, specially two small keys (Seal Cays), one having 4 and the other 12 coconut palms, and used at a point by navigators when passing between the mainland and the Corn Islands, can be no longer seen. The tidal wave affected the coast for 80 miles, extending from 10 miles N. of Bluefields to the N. Its greatest height was 15 feet (Monthly Weather Review, Oct. 1906). 7) New Orleans, Oct. 14. A wireless message from Bluefields to The Times- Democrat tonight says that a hurricane in the neighborhood of Puerto Limon has done \$ 125,000 damage to rubber and banana crops, besides other property damage (The New York Times, Oct. 15, 1906, p.1, col.6). Author's note: Puerto Limon (Costa Rica) could have been wrongly cited, being in reality Pearl Lagoon, which is N. of Bluefields. 8) New Orleans, Oct. 15. According to wireless reports received here, a strong cyclone has caused immense damage to towns along the Central American coast. Great damage to corn crops was done at Bluefields, devastating vegetation and even changing the country topography. At Manilano damage was reduced to a 30-mile wide belt, sweeping away the banana and rubber crops and destroying all plantations (Diario de la Marina, Havana, Oct. 16, 1906, evening edition, p.1, col.1. 9) Boston, Oct. 24. The United Fruit Company steamer "Limon" has arrived here from Puerto Limon, Costa Rica, and reports that Bluefields is in ruins and that the

banana plantations have been destroyed. Capt. Porter says that Little Corn Island did not show any sign of life when the "Limon" passed and that, contrary to reports, Costa Rica appears to have escaped damage of consequence. Great Corn, although showing signs of devastation, did not appear to have suffered as much as Little Corn Island (The New York Times, Oct. 25, 1906, p.1, col.2). 10) Mobile, Al., Oct. 22. The first news of a hurricane which visited the towns of Ruatan (it should read Roatan), Tela, Utila, Colorado and El Provençe on Oct. 12 was brought here last night by the steamer "Harald", which arrived with a cargo of fruit. A number of vessels were wrecked, several destroyed and buildings in each of the towns mentioned badly damaged. The damage to the owners of the fruit plantation it is stated amounts to \$ 1 million. The schooner "Southern Queen" was thrown ashore on the beach at Ruatan and went to pieces in less than one hour time, and the "Harald" suffered somewhat and will have to be docked. A great wave accompanied the storm and swept everything before it. Capt. Henrichsenn said that, when he left, the beaches were strewn with vessels of all kinds, including 3 sailing vessels. No lives were reported lost at the time of the sailing of the "Harald" (The New York Times, Oct. 23, 1906, p.5, col.3). 11) The American Consul, Jose de Olivares, at Managua, Nicaragua, under date of Oct. 26, reported that during the interval of 2 weeks, from Oct. 8-22, the entire consular district was visited by what it was probably the severest rain storm which has ever occurred in that part of the world. At Corinto, in addition to the downpour of rain, there was experienced an unusually heavy sea which badly damaged a part of the new dock in process of construction in that port. But the severest conditions and worst results in the district were reported from our consular agent in Matagalpa, in the northern mountain region of this country. In several cases, tremendous landslides, carrying away whole hillsides, occurred (Monthly Weather Review, Oct. 1906). 12) San Salvador, Oct. 19. A tempest has raged incessantly for 10 days throughout the Republic. Today the storm is abating. Guatemala and Honduras have also suffered severely. It is said that losses there will amount to many million dollars (The New York Times, Oct. 20, 1906, p.2, col.2). 13) Belen College Observatory. The cyclone which we have seen announced in Diario de la Marina this morning should be the same one which was announced to the S. and near Barbados on Oct. 12. Its effects will probably be felt at Trujillo (Honduras) today and it is likely that the cyclone is getting ready for recurvature to the N.E. over the Gulf of Honduras. L. Gangoit, S.J. (Diario de la Marina, Oct. 16, evening edition, p.4, col.1). Author's note: The cyclone referred to above was found to be unrelated to the one reported as being to the S. of Barbados on Oct. 12. 14) Belen College Observatory, Oct. 17, 11 A.M. The cyclone has come somewhat closer to us since yesterday; it is getting ready for recurvature and will probably pass over the western portion of the island (Cuba) within 40 hours. L. Gangoit, S.J. (Diario de la Marina, Havana, Oct. 17, 1906, evening edition, p.1, col.4). 15) National Meteorological Observatory. Oct. 17, 10 A.M. The vortex of the cyclone of Oct. 15 in Central America appears to be to the W.S.W. of Havana, moving towards the N. (Diario de la Marina, Oct. 17, 1906, p.1, col.4). 16) Belen College Observatory, Oct. 17, 4:30 P.M. The center of the cyclone is rapidly approaching Havana province, and will probably pass over the capital or its vicinity tonight. If a calm were observed, the wind would blow later from the opposite direction it was blowing before (Diario de la Marina, Havana, Oct. 18, 1906, supplement, p.1, col.1). 17) National Meteorological Observatory, Oct. 17, 4 P.M. The cyclone from the Caribbean Sea has recurved and it approaching; its center will pass to the W. of Havana province (Diario de la Marina, Havana, Oct. 18, 1906, supplement, p.1, col.1). 18) The observer from the Climatology and Crop Service at Nueva Gerona (Isle of Pines) reported the following: The proximity of the cyclone was noted here by daybreak Oct 17 with heavy showers, accompanied by S.E. winds

which increased during the day. Then, the wind blew from the S. and changed to the S.W. at 3:30 P.M. The change was abrupt, the wind reaching hurricane force which blew down trees and destroyed flimsy houses W. of the city. By 5 P.M. the destructive work of the hurricane had ended (Diario de la Marina, Havana, Oct. 24, 1906, morning edition, p.5, col.5-6). 19) Some pressure readings taken at Havana: Oct. 17, evening (time not specified), 748 millimeters or 29.45 inches; 9 P.M., 744 millimeters or 29.29 inches; 10 P.M., 740 millimeters or 29.13 inches; 11 P.M., 737 millimeters or 29.02 inches; 11:30 P.M., 734 millimeters or 28.90 inches; midnight (Oct. 17-18), 736 millimeters or 28.98 inches; 12:15 A.M. Oct. 18, 739 millimeters or 29.25 inches; 3 A.M., 746 millimeters or 29.37 inches; 6 A.M., 750 millimeters or 29.53 inches (Diario de la Marina, Havana, Oct. 18, 1906, supplement, p.1, col.1). 20) National Meteorological Observatory, Oct. 18. At about 10 P.M. (Oct. 17), when the anemometer started malfunctioning, the wind was 96 mph (43 meters per second. At 11:30 P.M. the vortex was some 15 miles to the E., the wind was estimated at 120 mph, and the barometer read 734.6 millimeters (approximately 28.90 inches). Shortly after that time, the wind backed to N.N.W. and started to diminish, with rising barometer. The cyclone diameter was small and its motion quite rapid (Diario de la Marina, Havana, Oct. 19, 1906, morning edition, p.4, col.4-5). 21) Belen College Observatory, Oct. 24. The minimum barometer reading occurred at 11:30 P.M. (Oct. 17) and was 733.1 millimeters (28.86 inches), after being reduced to sea level. The wind velocity around 9 P.M. was 30 meters per second (67 mph) and, between 11 P.M. and midnight (Oct. 17-18) some gusts were over 40 meters per second (90 mph). We observed at that time that the wind was backing to N.M.E. and then to N.. It was then evident that the vortex was moving E. of Havana but not very far away. The wind blew hurricane force from the N., but it gradually diminished, although there were very strong gusts from the N.N.W. direction. The rain ceased and the barometer rose with great rapidity from 11:30 P.M. on (Diario de la Marina, Havana, Oct. 25, 1906, evening edition, p.4, col.1). Author's note: The above information was taken from an article signed by S. Sarasola, S.J. The Monthly Weather Review (Oct. 1906), Martinez-Fortun (1942) and Tannehill (1938) quoted the minimum pressure at Havana as 28.86 inches and/or the vortex passage to the east of that city, which were indicated in this item. 22) Taken from Revista de Agricultura: At Batabano, the first hurricane winds blew from the S., and then from the W., indicating that the cyclone vortex passed inland just W. of that place about 9 P.M. (Oct. 17). At Jaruco, they had winds from the E. between 11 P.M. and midnight, calm and then wind from the W., indicating that the vortex left the island (Cuba) near that place. The diameter of the cyclone did not exceed 100 miles, having affected only the province of Havana and portions of Pinar del Rio and Matanzas and the Isle of Pines (Diario de la Marina, Havana, Oct. 24, 1906, evening edition, p.1, col.4). 23) At Guines, the wind blew from the E. and S., and around 10 P.M. it blew very hard from the last direction; the calm lasted 1 hour and 15 minutes without any rain or drizzle. At "Merceditas" sugar mill, to the W. of Guines, the calm lasted for two hours and the wind jumped from S.E. to N.W. It can be inferred from the above data and those from Matanzas and Jovellanos that the center passed over Melena del Sur (Diario de la Marina, Havana, Oct. 25, 1906, evening edition, p.4, col.1). Author's note: The above information was taken from the article about the storm which was signed by S. Sarasola, S.J. of the Belen College Observatory. It should be mentioned that the vortex passage over Melena del Sur is in good agreement with information in item 22). 24) New York, Oct. 18. Cable communication with Havana was interrupted at 11 o'clock last night and has not yet been restored. Shortly before the communication was broken the telegraph operator at Havana told that a great storm was raging. Soon afterward he said that the gale had become a hurricane (The

Times, London, Oct. 19, 1906, p.3, col.6). 25) New York, Oct. 19. The first news of the effects of the storm in Havana came in a dispatch to the Evening Telegram. It said that 100 persons have been killed, that the whole American fleet at Havana harbor is wrecked and that the cruiser "Brooklyn" has been torn from her moorings and thrown upon the shore. When the tempest reached its height buildings were shaking as by an earthquake (The Times, London, Oct. 20, 1906, p.5, col.4). 26) Senor Luis G. Carbonell, Chief of the Meteorological Service of Cuba, reports that in its passage over that island, the storm was of great intensity, small diameter and rapid march, and that its force extended to the W. as far as Pinar del Rio, with strong winds from the N. and N.W.; that great damage was not caused in the provinces of Matanzas and Pinar del Rio, but that in the Province of Havana there was great destruction of cane, trees and all plants in general. In the city of Havana there were some fatalities caused by the falling of houses that were in bad condition (Monthly Weather Review, Oct. 1906). 27) Oct. 17-18, 1906. An intense hurricane crossed the Island (of Cuba) E. and near Havana, causing numerous fatalities and damage to crops, cities and vessels (Sarasola, 1929). Author's note: Actually taken from the catalog of Cuban cyclones by M. Gutierrez-Lanza which is included in Sarasola (1928). 28) A cyclone of great intensity crossed the province of Havana on Oct. 17, 1906 and caused damage and ruined the trees at the (Cuban) capital (Martinez-Fortun, 1942). 29) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Oct. 18. center placed 24.7 N., 80 W. (probably a bit S. and E.); difficult to read observations; Key West, N.W. f. 9, pressure could not be read. Oct. 19, ship near 31 N., 77.7 W., E. f. 9, 29.26; center placed 30 N., 78.3 W. Oct. 20, ship near 32 N., 77 W., E. f. 8, pressure could not be read; Charleston, N.N.E. speed could not be read, 29.47; Wilmington, N.E. f. 6, 29.52; center placed 31.5 N., 78 W, probably a bit S. Oct. 21, Jacksonville E. f. 4, 29.64; Tampa, W. f.3, 29.66; center between both cities. Oct. 22, Tampa, E.N.E. speed could not be read, 29.85; Key West, S.W. f. 4, 29.80; center placed 26 N., 82.3 W.. Oct. 23, ship near 22.7 N., 86.2 W., N.E. f. 5, 29.68; ship near 21.5 N., 85.5 W, no wind reported, 29.80, showers; center placed 22.5 N., 85.5 W. Oct. 24, center no longer identified (Historical Weather Maps, Oct. 1906). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 30) Some observations taken at Key West, Fl.: Oct. 17, noon, 29.67, E. 17; 4 P.M., 29.62, W. 10; 8 P.M., 29.59, N.E. 14; 10 P.M., 29.53, N.E. 23; midnight, 29.46, N.E. 27; 1 A.M. Oct.18, 29.42, N.E. 26; 2 A.M., 29.36, N.E. 29; 3 A.M., 29.30, N.E. 33; 4 A.M., 29.32, N.E. 34; 5 A.M., 29.36, N. 41; 6 A.M., 29.42, N.W. 38; 7 A.M. 29.48, N.W. 45 A.M., 29.57, N.W. 50; 9 A.M., 29.60, N.W. 38; 10 A.M., 29.62, N.W. 26; noon, 29.63, N.W. 33; 4 P.M., 29.67, N.W. 27; 8 P.M. , 29.74, N.W. 17 (Cline, 1926). Author's note: Pressures are in inches; wind speeds are in mph. 31) Taken from a report from F.E. Tartwell, assistant observer at Key West. About 3:30 A.M. Oct. 18 the wind backed to N. and by 4:30 A.M. to the N.W. The barometer fell until 3 A.M., with minimum reading 29.30 inches. The center of the storm passed very near and S.E. of the station. At Sand Key the lowest reading was about 29.25 inches, and wind velocities as high as 75 mph were recorded at that station. The highest velocity at Key West, 54 mph occurred at 7:20 A.M. Oct. 18. The Revenue cutter "Fessenden" was the only large vessel that received injuries in this port. The quarter boats of the East Coast Extension were carried out to sea and many lives, probably more than 100, were lost. Forty-five men were picked up by the steamer "Jenny" and returned to Key West; 24 were landed at Savannah, Ga., and a number were picked up by other steamers (Monthly Weather Review, Oct. 1906). Author's note: The Daily Miami Metropolis, Oct. 19, 1906, p.1, col.3 added that the survivors picked up by the "Jenny" were part of 150 men who were in waterboat N. 4 at Long Key, which was driven out to sea by the storm and went to pieces. 32) The

following extract from the log of tug "Sybil", moored at Miami, Fl. during the storm was furnished by master Dan Ross: Oct. 18, 4 A.M., N.E. gale blowing with much rain. Barometer falling rapidly. At 9:30 A.M. wind died out and the lowest barometer (28.55 inches) was noted. The calm lasted about 30 minutes, then came on a blow from the N.W., backing to W.N.W. and blowing very hard until noon, when it began to abate, and by night the gale had ceased (Monthly Weather Review, Oct. 1906). Author's note: The Daily Miami Metropolis, Oct. 19, 1906. p.1, cols.1 and 4-5, also reported that about 9 A.M. Oct. 18 the wind (at Miami) died to a calm and many thought the storm had ended and that a few minutes later the wind shifted to N.W. with renewed energy. Several barometer readings ranged from 28.78 to 28.15 inches around 10 A.M. Oct. 18, being these values the lowest ever recorded at Miami. 33) The conductor of a train that late last night (Oct. 18) reached Ft. Pierce, Fl. from Miami reported terrible destruction there by the hurricane. Fully 100 houses have been blown down and the city was in a demolished condition. The churches of the Episcopal and Methodist denominations were blown down. The jail, when the train started, was leaning and in danger of turning over, and the prisoners had been removed. Just before the wires connecting Jacksonville with the south went down, the operator at Miami reported a big storm and an unusually high tide. The last word from there said that the water was 3 feet deep in the telegraph office and that low streets were flooded (The New York Times, Oct. 19, 1906, p.1, col.1). 34) Taken from a report by H.P. Harvin, Observer, Weather Bureau, Jupiter, Fl.: A passenger steamer, the "St. Lucie", an old river packet, was swamped and 23 of the 80 people on board were lost near Elliott's Key (Monthly Weather Review, Oct. 1906) 35) Some observations taken at Jupiter, Fl.: Oct. 18, 4 A.M., 29.65, S.E. 21; 8 A.M., 29.54, E. 30; 10 A.M., 29.38, E. 51; 11 A.M., 29.28, N.E. 55; noon, 29.26, N.E. 55, 1 P.M., 29.33, N.E. 44; 2 P.M., 29.45, N. 47; 3 P.M., 29.48, N.W. 41; 4 P.M., 29.53, N. 32; 6 P.M., 29.60, N.W. 18; 8 P.M., N.W. 15 (Cline, 1926). Author's note: Pressures are in inches; wind speeds are in mph. 36) Washington, Oct. 19. The hurricane which swept from Cuba to the Bahamas now appears to be raging at full force about 200 miles out in the Atlantic, the only shore effect being tonight a falling barometer and 25 mph winds blowing on the Carolina coast (The New York Times, Oct. 20, 1906, p.2, col.2). 37) Washington, Oct. 20. The western edge of the tropical hurricane which passed N.E. from the Florida Straits Thursday night (Oct. 18) struck the South Carolina coast at 5 this afternoon. The barometer at Charleston sank to 29.16 inches, with a maximum wind velocity of 64 mph from the N. No serious damage reported (The New York Times, Oct. 21, 1906, p.9, col.4). 38) An unusual course, and one which illustrates the effect of higher latitude events on hurricane motion, was that of the hurricane of Oct. 1906. Its northeastward course in the Atlantic was blocked by high pressure on the North Atlantic coast and on Oct. 20 it turned westward, then southward across Florida where it dissipated (Tannehill, 1938). Author's note: Rather than using the words "blocked by high pressure"..., it would be much more meaningful to say: stirred by the easterly air flow associated with high pressure on the North Atlantic coast... In addition, information in item 29) suggested that the storm dissipated over the southeastern Gulf of Mexico off western Cuba and not over Florida. 39) Some maximum wind velocities associated with the storm were: Sand Key, N.W. 75 mph; Key West, N.W. 54 mph; Jupiter, N.E. 60 mph; the date was Oct. 18 for the three stations above; Wilmington, N.E. 38 mph; Charleston, N. 64 mph; Columbia, N.E. 36 mph; Augusta, N.E. 32 mph; Savannah, N. 42 mph; the date was Oct. 20 for the five stations which were just mentioned (Monthly Weather Review, Oct. 1906). 40) Storm of Oct. 18-20, 1906. S.E. coast of Florida. Major. 164 killed. Miami, barometer 28.55 inches. South Carolina. Minor, remained offshore (Dunn and Miller, 1960). Author's note: The minimum pressure of 28.55 inches at Miami was

found to be a bit high to correspond to a major hurricane; however, pressure readings ranging from 28.78 to 28.15 inches discussed in the author's note accompanying item 32) were found to partially support major hurricane intensity. 41) Map showing a track for this storm as follows: Morning of Oct. 17, near 21 N., 84 W.; evening of Oct. 21, over Cuba to the S.E. of Havana; morning of Oct. 18, near 24.5 N., 80.5 W.; morning of Oct. 19, near 32 N., 76 W.; morning of Oct. 20, near 32.5 N., 77.5 W.; evening of Oct. 20, to the S.E. of Charleston; morning of Oct. 21, between Jacksonville and Tampa; evening of Oct. 21, just E. of Tampa (Monthly Weather Review, Oct. 1906). 42) A storm was first observed near 11 N., 82 W. on Oct. 9, 1906 and was last observed near 12 N., 84 W., having lasted less than one day. A second storm was first observed near 14 N., 64 W. on Oct. 11 and lasted 11 days; it recurved near 21 N., 85 W. and it was last observed near 26 N., 82 W. (Mitchell, 1924). Author's note: Tracks for these storms in Tannehill (1938) were found to be similar to the ones in Mitchell (1924); however, the track for the first storm in Neumann et al. (1993) was started one day earlier than in Mitchell (1924). It should be mentioned that the portions of the tracks over the Caribbean Sea for the second storm in the three publications above were not supported by data in Historical Weather Maps (Oct. 1906) and were found to be in error.

On the basis of information in the above items, the author of this study modified the tracks of Storms 7 and 8 in Neumann et al. (1993) and produced a track for a single storm which was designated as Storm 8, 1906. In fact, modified portions of the tracks in the above publication were used in preparing the author's track corresponding to Storm 8, 1906. His track was started with his 7 A.M. Oct. 8 position which was estimated near 11.3 degrees N., 77.3 degrees W. on the basis of information in item 1); this position was about 120 miles to the E. on the corresponding position for Storm 7 in Neumann et al. (1993); the author's track was not extended backwards from Oct. 8 because, although information in items 2) and 3) suggested a perturbation near the Windward Islands on Oct. 4-5, the existence of a closed cyclonic circulation could not be definitively established prior to Oct. 8. The author's 7 A.M. Oct. 9 position was estimated near 11.5 degrees N., 81.5 degrees W. on the basis of space-time continuity and information regarding landfall N. of Bluefields in the night of Oct. 9 (item 6); this position was about 30 miles to the E.S.E. of the corresponding one in Neumann et al. (1993) for Storm 7, 1906. The author's 7 A.M. positions for Oct. 10-11 were primarily based on space-time continuity between landfall occurrence on the Nicaraguan coast (item 6) and the author's 7 A.M. Oct. 12 estimated position; the author's 7 A.M. Oct. 10 was near 13.0 degrees N., 84.5 degrees W. and the analogous position for Oct. 11 was near 14.0 degrees N., 86.3 degrees W. The author's 7 A.M. Oct. 12 position was estimated near 15.5 degrees N., 87.3 degrees W. on the basis of information regarding to the storm on the northern coast of Honduras and adjacent islands contained in item 10). The author's positions for the period Oct. 13-14 were primarily based on space-time continuity between the above position and the author's estimated one for 7 A.M. Oct. 15; these positions were along the coast of Belize and allowed for some deceleration from Oct. 12 to Oct. 13 and a more marked deceleration from Oct. 13 to Oct. 14; the introduction of the deceleration was justified by the fact that the storm showed to be sharply recurving to the N., and the author's positions were estimated near 16.7 degrees N., 88.0 degrees W. at 7 A.M. Oct. 13 and near 17.7 degrees N., 88.3 degrees W. at 7 A.M. Oct. 14. Primarily on the basis of information in item 1), which includes observations taken at Merida (Yucatan), the author's 7 A.M. positions for the period Oct. 15-16 were estimated as follows: Oct. 15, near 18.5 degrees N., 88.0 degrees W.; Oct. 16, near 19.5 degrees N., 87.0 degrees W. These two positions showed a turn to the N.N.E. and N.E. and the 7 A.M. Oct. 16 position was

found to be about 150 miles to the W.S.W. of the corresponding position in Neumann et al. (1993) for Storm 8, 1906. The author's 7 A.M. Oct. 17 position was estimated near 20.7 degrees N., 84.5 degrees W. and was primarily based on space-time continuity as applied backwards, using information for Nueva Gerona in item 18; this position was found to be about 200 miles to the S.S.W. on the corresponding position in Neumann et al. (1993) for Storm 8, 1906. The author's 7 A.M. Oct. 18 position was primarily based on information about the storm at Miami in item 32) and was estimated near 25.3 degrees N., 80.7 W.; this position was found to be about 60 miles to the S.W. of the corresponding one in Neumann et al. (1993) for Storm 8, 1906. Author's 7 A.M. positions for the period Oct. 19-22 were primarily based on information in item 29), but information in item 37) and space-time continuity as applied backwards also became important on Oct. 20; positions for the above mentioned period were as follows: Oct. 19, near 30.0 degrees N., 78.0 degrees W.; Oct. 20, near 31.7 degrees N., 78.3 degrees W.; Oct. 21, near 29.5 degrees N., 81.5 degrees W.; Oct. 22, near 26.0 degrees N., 82.0 degrees W.; differences between the above positions and the respective ones in Neumann et al. (1993) for Storm 8, 1906 ranged from about 80 miles on Oct. 22 to about 30 miles on Oct. 20. On the basis of information in item 29), the track for Storm 8, 1906 in Neumann et al. (1993) was extended to Oct. 23, resulting in the author's estimated position near 22.3 degrees N., 85.7 degrees W. for 7 A.M. Oct. 23. The author's track for Storm 8, 1906 is shown in Fig. 2.

The content of a number of the 42 items above was found to support the hurricane status that Neumann et al. (1993) gave to Storms 7 and 8, 1906 in their publication; therefore, the author of this study showed that status along portions of his track for Storm 8, 1906. Hurricane status was first introduced along the author's track on Oct. 9 based on information in item 6) and was kept to around noon Oct. 10, some 14 hours after the storm made landfall on the Nicaraguan coast. On the basis of the content of item 10), the author decided to reinstate hurricane intensity shortly after the storm moved off the Honduran coast on Oct. 12, and such intensity was denoted along the author's track until late Oct. 20 (item 37). Based on pressure readings ranging from 28.78 to 28.15 inches taken at Miami (item 32) and on information in item 4, the storm was a major hurricane in the southeastern Florida area. In addition, information contained in several other items strongly suggested that the storm was a major hurricane in Cuba as well. Tropical storm intensity was denoted along the author's track on Oct. 8, from about noon Oct. 10 to the morning of Oct. 12 and from late Oct. 20 to late Oct. 21. The tropical depression (dissipation) stage was introduced along the author's track on Oct. 22 and continued on Oct. 23.

Storm 9, 1906 (Oct. 14-17), T. S.

The following information was found about this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Oct. 13, low placed 26.5 N., 63.5 W.; however, E. and S.E. winds were reported by ships to the S. of the low; a low, if any, should have been associated with a cold front extending from 40 N., 55 W. to 33 N., 61 W., but no low could be identified along the front. Oct. 14, ship near 34 N., 64.7 W., N. f. 4, 29.74; 1005 millibar (29.68) low placed 33 N., 63.5 W. Oct. 15, ship near 34 N., 69 W., E.S.E. f. 5, 29.62, showers; ship near 33 N., 73 W., N.N.W. f. 9, 29.71; ship near 35 N., 65 W., E.S.E. f. 6, 29.91; ship near 38 N., 67 W., W. f. 7, 30.06; low placed near 32.5 N., 69.5 W. (probably a bit far to the S.E.). Oct. 16, ship near 30 N., 77.7 W., N. f. 8 or higher, pressure not clearly read but probably 29.62; ship near 33 N., 76 W., E. f. 6, 29.77; ship near 29 N., 80 W., N.W. f. 5, 29.83; ship near 28 N., 79 W., N.W. f. 3, 30.00 (too high); center placed 30 N., 76.5 W. Oct. 17, Jacksonville,

N.E. f.4, pressure could not be read, drizzle; Tampa, N.W. f. 2, pressure could not be read; ship near 28 N., 79 W., W. f. 3, 29.74; low placed 28.5 N., 81.5 W. (too far W.). Oct. 18, system could not be identified, having been absorbed by the circulation of Storm 8, 1906 (Historical Weather Maps, Oct. 1906). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 2) Washington, Sept. 15. There is a disturbance over the Atlantic, S.E. of Hatteras (The New York Times, Oct. 16, p.9, col.6). 3) National Meteorological Observatory, Oct. 15, 3 P.M. We have received from the Weather Bureau of Washington the following advisory: "N.E. storm signals were ordered at 2:40 P.M. for Miami, Jupiter, Jacksonville, Savannah and Charleston. The perturbation off the S.E. coast of the United States will produce strong N. winds on that coast and in Florida" (Diario de la Marina, Havana, Oct. 16, 1906, morning edition, p.3, col.6). 4) National Meteorological Observatory, Oct. 17, 10 A.M. Yesterday afternoon we received the following telegram from the Weather Bureau of Washington: "At 4 P.M. weather conditions were suspicious near the central and southern Atlantic coasts and the eastern Gulf of Mexico, and strong N.E. winds are likely during the next 2 or 3 days" (Diario de la Marina, Havana, Oct. 17, 1906, evening edition, p.1, col.4). Author's note: Conditions over the eastern Gulf of Mexico were related to Storm 8, 1906 and not to this storm. 5) National Meteorological Observatory, Oct. 17, 4 P.M. We have received the following telegram from the Weather Bureau of Washington: "Northeast storm signals were placed at Apalachicola, Cedar Keys, Dunnellon, Tampa, Punta Gorda, Punta Rassa, Key West, Miami, Jupiter and Charleston due to a perturbation to the E. of the northern coast of Florida and one that appears to be approaching Cuba from the Caribbean Sea" (Diario de la Marina, Oct. 18, 1906, supplement, p.1, col.1). Author's note: The perturbation approaching western Cuba was Storm 8, 1906. 6) A storm was first observed near 30 N., 62 W. on Oct. 13, 1906 and lasted 4 days; it was last observed near 30 N., 79 W. (Mitchell, 1924). Author's note: Tracks for this storm in Tannehill (1938) and Neumann et al. (1993) were found to be similar to the corresponding one in Mitchell (1924).

On the basis of information in the above items, item 1) in particular, the author of this study introduced some modifications along the track for this storm in Neumann et al. (1993). As the weather system could not be identified as a closed circulation on Oct. 13 (item 1), the author of this study started his track with his 7 A.M. Oct. 14 position which was estimated near 33.7 degrees N., 63.5 degrees W. on the basis of information for that day in item 1); this position was found to be about 50 miles to the E. of the one in the above publication. The 7 A.M. Oct. 15 position was kept unchanged because it was found to agree with information for that day in item 1). Author's estimated positions were near 30.5 degrees N., 76.5 degrees W. for 7 A.M. Oct 16 and near 29.3 degrees N., 79.5 degrees W. for 7 A.M. Oct. 17; these positions were based on information in item 1) and in items 1) and 5), respectively, and were found to be about 120 miles to the S.W. of the 7 A.M. Oct. 16 position in Neumann et al. (1993) and about 70 miles to the E. of the one for 7 A.M. Oct. 17 in the above publication. The author's track for Storm 9, 1906 is displayed in Fig. 2.

The tropical storm status which Neumann et al. (1993) gave to this storm was supported by ship information in item 1); that status was denoted along the author's track over the period Oct. 14-16 and was changed to the tropical depression (dissipation) stage on Oct. 17 in compliance with information in item 1).

Storm 10, 1906 (Oct. 15-20), T. S.

The following information was found in relation to this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Oct. 14, Santo Domingo, N. f. 2, 29.84; San Juan, S. f. 1, 29.83; Turks Is., N.E. f. 1, 29.85. Oct. 15, Turks Is, N.N.W. f. 4, 29.72; Santo Domingo, S. f. 3, 29.76; San Juan, S. f. 3, 29.76; center placed 22 N., 69.5 W., defined by a 1005 millibar (29.68) closed isobar. Oct. 16, Turks Is., W f. 3, 29.74; ship near 28 N., 70 W., E.S.E. f. 5, 29.68; ship near 27 N., 74 W., E. f.2, 29.86; center placed 27 N., 70.5 W. (maybe a bit to the E.). Oct. 17, ship near 28 N., 74 W., N. f. 8, 30.06; ship near 26 N., 68 W., 29.68; ship near 25 N., 69 W., W. f. 2, 29.80; center placed 27 N., 69 W. and denoted by a 1005 millibar (29.68) closed isobar (too far S.). Oct. 18, ship near 28 N., 68 W., W. f. 4, 29.74; ship near 25 N., 69 W., S.W. f. 3, 29.88; ship near 32 N., 63 W., E.N.E. f. 2, 29.94; center placed 29.3 N., 66 W., enclosed in a 1005 millibar (29.68) isobar. Oct. 19, no data around the center; center placed, still 1005 millibars (29.68), 27 N., 60 W. (probably too far E.). Oct. 20, ship near 28 N., 56 W., S. f. 2; ship near 29 N., 58 W, calm; center near that ship on the basis of the reported calm was also inferred from the curvature of the 1010 millibar (29.83) isobar. (Historical Weather Maps, Oct. 1906). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches.

Curiously, neither Mitchell (1924) nor Tannehill (1938) included tracks for this storm in their works. Therefore, the track in Neumann et al. (1993) was the only one available to the author of this study who introduced some modifications along such a track and extended it backwards from one day. The author's track was started with his 7 A.M. Oct. 15 estimated position near 21.7 degrees N., 70.0 degrees W., which was the earliest one which could be determined from information in item 1) because no closed cyclonic circulation could be inferred from the weak winds reported on Oct. 14. Author's 7 A.M. positions for the period Oct. 16-20 were estimated as follows: Oct. 16, near 26.5 degrees N., 71.3 degrees W.; Oct. 17, near 28.5 degrees N., 69.3 degrees W.; Oct. 18, near 29.3 degrees N., 66.0 degrees W.; Oct. 19, near 29.3 degrees N., 62.0 degrees W; Oct. 20; near 29.0 degrees N., 58.0 degrees W. The author's track for storm 10. 1906 is displayed in Fig. 2.

Rigorously speaking, the tropical storm status which Neumann et al. (1993) gave to this storm was suggested by only one ship report showing a force 8 wind on the Beaufort scale. But, in addition, winds of barely tropical storm intensity could be inferred to have existed E. of the center at least on Oct. 15, when a N.N.W. f. 4 (roughly 15 mph) was reported at Turks Is (item 1) as the storm center was moving towards the N.N.W. at an estimated rate of 13 mph. Therefore, tropical storm status was accepted and denoted along the author's track over the period Oct. 15-18; that status was changed to the tropical depression (dissipation) stage on Oct. 19.

It should be finally mentioned that the author of this study investigated a possible link of this storm with a gale reported to have occurred at Curacao on Oct. 13 but no evidence of a connection was found. The gale in question will be presented as a possible case for 1906.

Storm 11, 1906 (Nov. 5-9), H.

The following information was found in relation to this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Nov. 2, ship on southern Cuban coast near 80 W., E.N.E. f. 2, 29.97; ship near 16 N., 76 W., E. f. 5, 29.83. Nov. 3, ship on southern Cuban coast near 80 W., N.E. f. 2, 29.97; ship near 16 N., 76 W., S.S.E. f. 5, 29.83. Nov. 4, ship near 16 N., 74 W., E. f. 4, 29.86; ship near 13 N., 77 W., E.N.E. f. 5, 29.80. Nov. 5, ship on

the southern Cuban coast near 80 W., E.N.E. f. 2, 29.88, rain; ship near 12 N., 74 W., E.N.E. f. 5, 29.74; ship near 11 N., 81 W., N.E. f. 2, 29.83; ship near 18 N., 84 W., N.E. f. 3. Nov. 6, ship near 16 N., 74 W., S.E. f. 5, 29.74; ship near 14 N., 79 W., N. f. 3 (wind direction probably wrong), 29.83, rain; ship near 24 N., 80 W., E. f. 9, 29.88; ship near 18 N., 76 W., E.S.E. f. 3; low placed 20 N., 79 W. (too far E.). Nov. 7, ship near 25 N., 80 W., E. f. 6, 29.86; ship near 18 N., 80 W., N.W. f. 5, 24.74; ship near 17 N., 76 W., S.E. f. 4, 29.77; ship near 13 N., 79 W., W.N.W. f. 1, 29.86; center placed 17.5 N., 78.5 W. (position proved to be wrong because the storm was found to be over Cuba). Nov. 8, ship near 27 N., 76.5 W., N.N.E. f. 6, 30.03 (too high); ship near 27 N., 74 W., E.N.E. f. 3; Turks Is, S. f. 4, 29.83; ship near 20 N., 74 W., S.W. f. 3, 29.83; ship near 17 N., 77 W., calm, 29.80; ship near 19 N., 79 W., W.N.W. f. 3, 29.86; low placed 23 N., 75.5 W. Nov. 9, ship near 26.5 N., 74 W., N.E. f. 7, 29.88; ship near 23 N., 74 W., W.S.W. f. 2, 29.91; Turks Is., S.W. f. 5, 29.87; center not placed on map, but probably near 24.5 N., 72.5 W., about to be merging with a cold front. Nov. 10, no center could be easily identified along the front (Historical Weather Maps, Nov. 1906). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 2) Belen College Observatory, Nov. 2, 4 P.M. The perturbation near Grand Cayman has acquired better organization during the last 24 hours and has moved a little to the W. It is getting ready for recurvature. L. Gangoiti, S.J. (Diario de la Marina, Havana, Nov. 3, 1906, morning edition, p.5, col.2). 3) Belen College Observatory, Nov. 3, 8 A.M. The fairly organized perturbation appears to be stationary with little force of aspiration. We expect that it will weaken under the influence of the intense anticyclone which has been present since the last day of last month as we indicated two days ago. L. Gangoiti, S.J. (Diario de la Marina, Nov. 3, 1906, evening edition, p.1, col.3). 4) Belen College Observatory, Nov. 5, 10 A.M. There is a true fight between the anticyclone and the low pressures to the S., which shows up in the barometer behavior, drizzle, sky appearance and steadiness of the currents. Today these ones appear to respond to the perturbation to the S. of this province (Havana) and about 200 miles, which is resisting to dissipate. The perturbation remains as stationary and it is not of great intensity so far. S. Sarasola, S.J. (Diario de la Marina, Havana, Nov. 5, 1906, evening edition, p.1, col.4). 5) Belen College Observatory, Nov. 5, 5 P.M. The cyclonic perturbation has gained some intensity this afternoon, and has become closer to Isle of Pines. The western provinces and perhaps Santa Clara are the most likely places to feel its influence. S. Sarasola, S.J. (Diario de la Marina, Havana, Nov. 6, 1906, morning edition, p.3, col.2). 6) National Meteorological Observatory. Observations taken at 8 A.M. Nov. 5: Pinar del Rio, barometer 756.50 millimeters (29.78 inches), moderate E. wind; Havana, barometer 757.30 millimeters (29.81 inches), fresh E. wind; Santiago de Cuba, barometer 757.43 millimeters (29.82 inches), light N. wind. The above data do not show the existence of a cyclone and the present weather is associated with the strong breeze, which is accompanied by the rains caused by the prevailing disturbance (Diario de la Marina, Havana, Nov. 6, 1906, morning edition, p.3, col. 2-3). 7) Belen College Observatory, Nov. 6, 9 A.M. The barometer drop and the circulation of the currents proved that the perturbation had gained in intensity yesterday. It is now located to the E. of Isle of Pines, between the meridians of Havana and Cienfuegos, with some increase in intensity. Here (at Havana) the wind continues getting stronger and the perturbation will be felt by the incoming ships, but we do not believe they will be in danger. A telegram was sent to Cienfuegos indicating that they should be on alert; and the Matanzas and Santa Clara provinces should be also aware of the situation. S. Sarasola, S.J. (Diario de la Marina, Havana, Nov. 6, 1906, evening edition, p.1, col.4). 8) Belen College Observatory, Nov. 6, 5 P.M. The most threatened provinces (of Cuba)

are the central ones. The tempest, with some intensity, has moved towards the S. of Cienfuegos. S. Sarasola, S.J. (Diario de la Marina, Havana, Nov. 7, 1906, morning edition, p.4, col.4). 9) Belen College Observatory, Nov. 7, 9 A.M. Meteorologists in Washington confirmed yesterday the existence of the cyclone. The first advice was given to them on Nov. 2 and yesterday afternoon we indicated to them that it was gaining in intensity and that it was heading to the Lucayas (Bahamas) through the central provinces (of Cuba). The telegraph in interrupted and we lack observations, but we believe that the cyclone is crossing central Cuba to the E. of Cienfuegos, heading for the Lucayas or their vicinity. S. Sarasola, S.J. (Diario de la Marina, Havana, Nov. 7, 1906, evening edition, p.1, col.5). 10) National Meteorological Observatory, Nov. 7, 4 P.M. Mr Beal of the "Guaibaro Colony" (to the E. and near Cienfuegos) telegraphed the following at 4:45 P.M. yesterday (Nov.6): "Barometer reduced to sea level 29.63 inches, cloudy sky, fresh N.E. wind and showers with heavy rains". Santiago de Cuba at 4 P.M. today (Nov. 7): Barometer 29.66 inches, light S.E. wind, cloudy sky. The Weather Bureau of Washington telegraphed as follows: "N.E. storm warnings have been placed at Miami and Jupiter. The perturbation which is located over central Cuba will probably move E. of N. over the Bahamas" (Diario de la Marina, Havana, Nov. 8, 1906, morning edition, p.3, col.3). 11) National Meteorological Observatory. Telegram from Cruces, 7:50 P.M. Nov. 7: "By daybreak today, the sky was cloudy, after the violent gusts from the N.E. of the night of Nov. 6 had calmed; the pressure dropped to 748 millimeters (29.45 inches). Fresh N.E. (?) wind with partly cloudy sky during the day. At 7 P.M., calm, clear and pressure continues low". From Cifuentes (via mail): The tempest of rain and strong N.E. wind continued the last 24 hours; the barometer dropped from 11 P.M. (Nov. 6) to 3 A.M. (Nov. 7) when it started to rise , with gusts abating and heavy rain ceasing at 4:45 A.M. (Nov. 7). Telegram from Santiago de Cuba, 8 A.M. Nov. 8: "Barometer 755.91 millimeters (29.76 inches), wind S.W. 20 mph, cloudy sky, 77 millimeters (3.06 inches) of rainfall in the past 24 hours (Diario de la Marina, Havana, Nov. 8, 1906, evening edition, p.4, col.1). Author's note: Cifuentes and Cruces are towns in central Cuba. 12) Jaguey Grande, via Bolondron, Nov. 7, 11 A.M. We are under the influence of a heavy rain storm. It has been raining for 4 days. Delgado, correspondent (Diario de la Marina, Havana, Nov. 8, 1906, morning edition, p.3, col.3). Author's note: Jaguey Grande is a town in the interior of Matanzas province. 13) Washington, Nov. 6. Reports received during Tuesday (Nov.6) indicate that the tropical disturbance is still central to the S.W. of Cuba with slightly increased intensity (The New York Times, Nov. 7, 1906, p.9, col.6). 14) Washington, Nov. 7. The tropical disturbance is apparently moving in the direction of the Bahama Islands but no high winds have as yet been reported, except at Havana and in the vicinity of Jupiter (The New York Times, Nov. 8, 1906, p.9, col.4). 15) Washington, Nov. 8. The tropical disturbance has passed N.E. over the eastern portion of the Bahamas without increased intensity so far as is known (The New York Times, Nov. 9, 1906, p.9, col.5). 16) From "La Democracia", a Santa Clara newspaper, issue of Nov. 7: "Since 4 days ago we have been under the influence of a wind and rain storm. From 4 P.M. yesterday (Nov. 6), gusts increased in intensity until this morning, when the weather condition is abating". From "El Comercio", a Cienfuegos newspaper, Nov. 7: "The vortex of the cyclone, which had been announced with much anticipation, passed in the morning hours over the E. (portion) of the province, it is believed that between Trinidad and Sancti-Spiritus. The barometers are rising rapidly and signs of good weather are more evident as time elapses. Some news received by cable say that considerable damage was done at Trinidad but details are lacking" (Diario de la Marina, Havana, Nov. 9, 1906, evening edition, p.4, col.3). 17) From Postal of Remedios, Nov. 7. From 12:30 P.M yesterday (Nov. 6) to midnight,

the barometer dropped 2.5 millimeters (about one tenth of an inch), and from midnight (Nov. 6-7) to 10 A.M. today it rose 0.7 millimeters (about 3 hundredths of an inch). The wind blew always from the first quadrant, and at 10 A.M. changed to the N.N.E., gusty; the height of the wind was at 1 A.M. (Nov. 7). Facundo Ramos (Diario de la Marina, Nov. 10, 1906. evening edition, p.1, col.6). Author's note: Remedios is located on the northern coast of central Cuba, just W. of Caibarien. 18) Extracted from a letter by a subscriber: Mayajigua, Nov. 9. After incessant rains for 3 or 4 days, the weather had acquired the characteristics of a true cyclone at daybreak Nov. 7. The wind fury was such that for a moment everybody believed that was going to demolish all houses, because it was horrible the view of the small flimsy houses with their beams being forced by the violence of the wind and their rooms flooded by torrents of water coming in from every place; the neighbors were asking for help as they were trying to prevent that their belongings were taken by the impetuous current... (Diario de la Marina, Havana, Nov. 13, 1906, evening edition, p.4, col.1-2). Author's note: Mayajigua is located inland over the N.E. portion of Santa Clara (Las Villas) province. 19) Extracted from Revista de Agricultura: The tempest that prevailed last week has produced N.E. gusty winds which acquired its greatest intensity in the eastern half of Santa Clara province, where the rains were also much heavier than in the two easternmost provinces and Matanzas... Some wind damage was done to trees and plants over the eastern portion of Santa Clara province and extreme E. (it should read W.) of Camaguey province... More than 20 tobacco-houses were blown down in Santa Clara province. The wind destroyed banana plantations in N.E. Santa Clara province... and vegetable crops were lost at Moron (Camaguey province). There were floodings in towns and the country side of Ciego de Avila and Sancti-Spiritus as well as at Tunas de Zaza, with some houses and bridges being destroyed... (Diario de la Marina, Nov. 14, 1906, evening edition, p.1, cols.5-6). 20) Extracted from an article by S. Sarasola, S.J., Belen College Observatory, Nov. 14. On Nov. 1 Father Gangoiti announced that "there was an intense anticyclone over the eastern U.S." and that "at the edge of that high pressure area a cyclonic perturbation was forming near Grand Cayman, which would probably crossed the central provinces (of Cuba)". On Nov. 3 the depression seemed to be filling up, continuing its indecision on Nov. 4, but on Nov. 5 it deepened some and showed up a better force of aspiration some distance from Isle of Pines. By 8 A.M. Nov. 8 the dark cloud bank to the S. and S.W. of Havana had disappeared, and for a while cloudiness diminished. But by 9 A.M. the scene has changed: clouds, showers, and an ill-defined cloud bank showed up to the S.S.E., and nimbus clouds tended to converge. Frequent gusts started and frequently reached more than 22 meters per second (some 45 mph). Responding to a consult by cable from Santiago de Cuba, I replied the following at noon Nov. 6: "Cyclone of some intensity will probably move over Santa Clara province, E. of Cienfuegos, between today and tomorrow, pursuing a N.E. course. Father Gangoiti is absent. Sarasola". It is not easy to determine the track of the cyclone due to the lack of data, but we believe that we would not be far from reality if it were said that the center of the cyclonic perturbation, already organized as a cyclone of moderate energy, passed between Remedios and Ciego de Avila in the early morning of Nov. 7. Observations taken at the Jesuit school at Cienfuegos supported the above statement. At 2 A.M. Nov. 7 the barometer read 750 millimeters (29.53 inches), being the wind blowing from the N.E. with tempestuous force, and this was the minimum pressure (at Cienfuegos). The lower currents were changing more to the N. and the low clouds were coming from that direction at 6 A.M. (Nov. 7). There was no disorganization of the cyclone; on the contrary, it was gaining in organization and intensity with time (Diario de la Marina, Nov. 15. 1906, evening edition, p.4, cols.1-2). 21) Nov. 6-7, 1906. A cyclone of moderate intensity crossed the central provinces of

Cuba, causing damage of some consideration (Sarasola, 1928). Author's note: Actually taken from the catalog of Cuban cyclones by M. Gutierrez-Lanza, which is included in Sarasola (1928). It should be indicated that according to the nomenclature used in regard to weather systems in Cuba, the word "cyclone" normally refers to a storm of hurricane intensity. 22) A moderate cyclone caused damage and flooding in the central provinces (of Cuba) on Nov. 6-7, 1906 (Martinez-Fortun, 1942). 23) Table showing that a cyclone of weak intensity affected the Cuban provinces of Las Villas (Santa Clara) and Camaguey on Nov. 6-7, 1906 (Academia de Ciencias, 1970). 24) A storm was first observed near 16 N., 78 W. on Nov. 6, 1906 and lasted 7 days; it recurved near 18 N., 78 W. and it was last observed near 32 N., 28 W. (Mitchell, 1824). Author's note: A track in Tannehill (1938) is very similar to the corresponding one in the above publication; however, both tracks were found to be in serious error, particularly over the Caribbean Sea, Cuba, and the Atlantic to the east of the Bahamas. The track in Neumann et al. (1993) was somewhat different from the two tracks above, but it was still found to be in serious error over the Caribbean and Cuba.

On the basis of information in the above items, the author of this study introduced a number of modifications along the track for Storm 11, 1906 in Neumann et al. (1993). Although the content of items 2) and 20) suggested a perturbation in the western Caribbean Sea since early Nov., the author's track was not started until Nov. 5, when signs of intensification occurred (items 4 through 6, and 20). Based on information in these items and, to a lesser extent in item 1), the author's 7 A.M. Nov. 5 position was estimated near 19.5 degrees N., 82.5 degrees W. The time of this position was found to be 24 hours earlier than the one corresponding to the first position along the track in Neumann et al. (1993). The author's 7 A.M. Nov. 6 position was estimated near 21.0 degrees N., 81.5 degrees W., primarily on the basis of information in items 7), 8) and 20); this position was found to be about 425 miles to the N.W. of the corresponding one in Neumann et al. (1993). The author's 7 A.M. Nov. 7 position was based on a detailed analysis of information for that day contained in a number of items and was estimated near 22.0 degrees N., 79.3 degrees W.; this position was found to be about 120 miles to the N. of the one in the above publication. On the basis of information in items 1) and 11), the author estimated a 7 A.M. Nov 8 position near 23.3 degrees N., 75.7 degrees W., which was found to be about 90 miles to the S. of the corresponding position in Neumann et al (1993). The author's 7 A.M. Nov.9 position was based on information for that day in item 1) and was estimated near 24.5 degrees N., 72.3 degrees W; this position was found to be about 90 miles to the S. of the corresponding one in the above publication. The author's track for Storm 11, 1906 is displayed in Fig. 2.

On the basis that the word "cyclone" was of a general use when referring to the storm over Cuba in a number of the above items which include catalogs or tables of Cuban storms (items 21 through 23), and after taking into account that normally that word is reserved in the literature of Cuban storms to those attaining hurricane intensity, the author of this study decided to upgrade to a hurricane the tropical storm status which Neumann et al. (1993) gave to Storm 11, 1993. Hurricane intensity was, therefore, introduced along the author's track late on Nov. 6 as the storm center was approaching the southern coast of central Cuba and such intensity was kept until late Nov. 7. Prior to late Nov. 6 and from around midnight Nov. 7-8 to about noon Nov. 9, tropical storm intensity was denoted along the author's track. The extratropical stage was introduced along the track for the second half of Nov. 9.

Special statement.

In addition to the eleven storms which were fully discussed above, three possible cases were found in 1906. These three cases are presented next.

A) Case of Sept. 16, 1906

This possible case was based on information published in *The Times*, London, Oct. 3, 1906, p.8, col.2. in regard to the schooner "Morales". The steamer "Bosefield", while on voyage from Tampico to New York, rescued 4 men, survivors of the schooner "Morales" which foundered during a hurricane on Sept. 16 while voyaging between Campeche and Tuxpan. The captain, mate and three seamen were drowned. The survivors were discovered on a raft made of 4 pieces of cedar lashed together and presented a pitiable spectacle. They have been 24 hours floating on the raft with seas sweeping over them. The weather map for Sept. 16 in *Historical Weather Maps* (Sept. 1906) does not show any data in the Gulf of Campeche area which could be used to verify if indeed there was a tropical storm there on the day mentioned; no sign of a storm was found for the next few days either as some coastal data were available. Under the above circumstances, the author of this study decided to keep this case as a possible one.

B) Case of Oct. 13, 1906.

This possible case was related to the wreck of the steamer "Oranje-Nassau" on the coast of Curacao in the morning of Oct. 13. In a dispatch from Willemstad, Curacao, on Oct. 13, *The New York Times*, Oct. 14, 1906, p.6, col.4, stated that the steamer "Oranje-Nassau" had gone ashore 3 miles E. of that place in a severe gale in the morning of Oct. 13 and that the vessel was likely to become a total wreck. Similar information was also published in *The Times*, London, Oct. 15, 1906, p.4, col.4, citing a dispatch from Willemstad, Oct. 14. In a dispatch from San Juan, Puerto Rico, dated on Oct. 19, *The New York Times*, Oct. 20, 1906, p.2, col.2, published that the "Philadelphia" had arrived there 48 hours late and said that the reason for the delay was that the ship was wrecked (it did not specify where) and met the storm upon leaving La Guayra on Monday, Oct. 15. The "Philadelphia" brought news indicating that a Dutch steamer was lost in a cyclone at a point between Curacao and La Guayra (probably the same case of the above mentioned "Oranje-Nassau") and that 20 miles of railroad connecting La Guayra from Caracas had been totally destroyed by the storm. Examination of maps in *Historical Weather Maps* (Oct. 1906) revealed a sort of disturbance, probably embedded in the Intertropical Convergence Zone, to the N. of the island of Trinidad, which reported a S.W. f 4 wind with heavy rain in the morning of Oct. 10; the above report was also in line with the disturbance that the Belen College Observatory had announced as "some signs of a cyclonic perturbation" to the W. of Barbados in the afternoon of Oct. 9 (*Diario de la Marina*, Havana, Oct. 10, 1906, morning edition, p.4, col.5). Data for Curacao as displayed on morning maps in *Historical Weather Maps* (Oct. 1906) were examined for the period Oct. 9-16 with the following results: a) the wind changed from E. on Oct. 9 to S. on Oct. 10, suggesting that the Intertropical Convergence Zone moved from the S. to the N. of Curacao during the 24-hour period; b) the wind, as shown on plotted morning data, was found to be from the S.W. over the period Oct. 11-15, suggesting that the Intertropical Convergence Zone remained to the N. of Curacao during those 5 days; c) the wind changed from S.W. on Oct. 15 to N. on Oct. 16, suggesting that the Intertropical Convergence Zone returned to the S. of Curacao during the 24-hour period. The strongest wind

at Curacao (as plotted on morning maps) was S.W. f. 4 on Oct. 13, accompanied by rain; a somewhat higher wind (W.S.W. f. 5) was reported by a ship near 10.7 N., 67 W. (off La Guayra) on the morning of Oct. 12. Rainfall at Curacao was 4.48 inches for the 24-hour period ending at 8 A.M. Oct. 13. It seems from the above information that the weather condition which caused the destruction of railroads in Venezuela and the wreck of the "Oranje-Nassau" in a heavy gale near Willemstad, Curacao, on Oct. 13 was an ITCZ disturbance and not a tropical storm having a closed circulation of its own. However, there was on the Oct. 13 map a ship near 13 N., 70 W. (just N.W. of Curacao) showing an E.N.E. f. 4 wind which, if it were correct, would allow for a possible cyclonic circulation to have existed, at least temporarily, on Oct. 13. This is why the author of this study decided to keep this one as a possible case.

Case of Oct. 14-15, 1906.

The morning map for Oct. 13 in Historical Weather Maps (Oct. 1906) showed a low near 24.5 N., 91.5 W., but without any data supporting the closed circulation. However, a ship near 28 N., 92 W. reporting a S.E. f. 7 wind and a pressure of 29.80 inches with rain and a N. wind f. 6 with rain at Galveston indicated a low pressure area in the Gulf of Mexico in the morning of Oct. 14; consequently, a low was placed on the map near 26.5 N., 93.5 W. By the morning of Oct. 15 the wind was N.W. f. 4 at Galveston, but no center was drawn on the corresponding weather map. No winds of tropical storm intensity were reported in connection with this low pressure area, which was not even tracked in the Monthly Weather Review (Oct. 1906). However, the author of this study believes that this low pressure area had a moderate chance of having become a tropical storm before passing inland late on Oct. 14 or on Oct. 15, and this is why he decided to keep this one as a possible case.

Two other cyclonic circulations were found over the tropical or subtropical Atlantic in Oct. 1906. One of them was first placed near 11.5 N., 55 W. on Oct. 11 (Historical Weather Maps, Oct. 1906) and announced by the Belen College Observatory as some signs of a perturbation to the S. and not very far from Barbados in the afternoon of Oct. 12 (Diario de la Marina, Havana, Oct. 13, 1906, morning edition, p.4, col.6); this system moved towards the N., just E. of the Lesser Antilles, for several days and winds at stations did not exceed force 3 on the Beaufort scale, indicating that the system remained weak. The second cyclonic circulation was placed over and to the N.E. of the Bahamas on weather maps for Oct. 25-27 (Historical Weather Maps, Oct. 1906), with just one wind report showing force 4 on the Beaufort scale. On the basis of the above information, the author of this study believes that these two circulations practically did not have any chance to have attained tropical storm intensity and, therefore, he decided not to include them as possible cases.